

Impact of Multisensory Stimulation on Motor and Mental Development of Infants

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KEYWORDS Infants. Growth and Development. Heredity. Environment. Psychomotor Development Index

ABSTRACT The present study was undertaken to find out the impact of multisensory stimulation on motor and mental development of infants. A sample size of 100 full term, single tone infants with normal birth weight belonging to the age group birth to 18 months were selected. They were grouped into experimental and control groups and multisensory stimulation was given to the experimental group. The motor and mental development of infants were tested twice (pre test and post test) with Bayley Scales of Infant Development (BSID). Stimulation was given to the infants for duration of 6 months, twice in a week for 20-25 minutes each day. Statistical analysis revealed significant differences between the experimental and control groups in mental and motor development of infants. It was found that there was a positive impact of multisensory stimulation on motor and mental development of infants. Significant age differences have been seen in Psychomotor Development Index (PDI) and Mental Development Index (MDI) of infants.

INTRODUCTION

Infancy is the period of rapid growth and development. During this period, a great deal of initial learning occurs. Heredity and environment both play important role in the development of baby's capacities but undoubtedly, it is the environment which decides the acquisition of different capacities. Infancy scholar Zeanah (2000) says, "From the very first days of life, infants demonstrate awareness of their environment and evidence of learning, confirming that different family experiences affect infant development far earlier than once thought possible." Parents who create a loving, stimulating, encouraging, and safe environment lay down a foundation for their children that will benefit them through out their lives.

Infants are amazing; their brains are changing at lightning speed. Activity in the brain creates tiny electrical connections called synapses. The amount of stimulation an infant receives directly affects how many synapses are formed. According to research, an infant's brain is producing 2-3 million synapses per second. So, during this important time, it is essential that infant be exposed to appropriate levels of stimulation. Stimulation through the senses of touch, hearing, seeing, smelling and tasting directly affect the sensory neurons and help in estab-

lishing these connections. Rich intervention programme in the form of stimulation helps in providing gainful positive inputs to the infants (Sharma and Nagar 2004). Derevensky and Kastner also (2006) found that an interdisciplinary infant stimulation- parent education intervention strategy was an effective method of parent education in enhancing infant gains on developmental indices.

It is true that development takes place according to a certain sequence and that many skills and abilities only come with maturation. At the same time, it is equally true that the kind of stimuli and support given by the environment makes a great deal of difference to development. A child who has a supportive environment that is, one who receives help and encouragement will develop more than one with a less supportive one (Swaminathan 1991). Environmental influences have the greatest effect on the child during periods of rapid development. Therefore enrichment/deprivation during the early years of life is particularly vital as far as later development is concerned (Murlidharan 1992). Environment is the major influencing factor for development of motor and mental abilities.

In the light of such researches, the present study was carried out in the year 2010-2011 to find out the impact of multisensory stimulation

on motor and mental development of infants and to see whether age difference exists in Psychomotor Development Index and Mental Development Index of infants.

MATERIAL AND METHODS

A total sample of 100 infants belonging to the age group of birth to 18 months were selected from one Community Developmental Block of Jorhat District of Assam. Full term, single tone infants without any chronic diseases and having normal birth weight of >2.5 kg were selected for this present study. These infants were divided in three age cohorts namely birth to six months, six to twelve months and twelve to eighteen months. The total sample was grouped in control and experimental group. The two groups were matched in home environment, Psychomotor Development Index (PDI) and Mental Development Index (MDI). Both the groups were from rural areas having similar socio-cultural practices and socio-economic status. Most of the families from both the groups had small businesses like small shops, tailor, carpenter and low-paid Government services like police constable, clerk, *Anganwadi* workers, *Anganwadi* helpers etc.

The infants of both the groups were assessed for mental and motor development through Bayley Scale of Infant Development (BSID) before and after stimulation. The motor

and mental age of infants was calculated by considering the total number of items performed by infants as per Baroda's standard. Further Psychomotor Development Index (PDI) and Mental Development Index (MDI) were calculated by converting the raw scores.

A multisensory stimulation kit was used to provide stimulation to the infants of experimental group. The kit contained different materials like mobile, rattles, visual cards, mirror, balls etc. for stimulation of different senses. Home based intervention was given to the infants of experimental group in the form of multisensory stimulation for duration of 6 months, twice in a week for 20-25 minutes each day. During this period each infant of experimental group were given various stimulation like visual, tactile and auditory with different play materials of the kit and observed their responses to these stimuli.

After 6 months, infants of both experimental and control groups were again tested with BSID to see the impact of stimulation on motor and mental development of infants. Significance of differences was calculated with Analysis of Variance-three way classification.

RESULTS AND DISCUSSION

The results of impact of multisensory stimulation on motor and mental development of infants are presented in Table 1 and Table 2.

Table 1: Mean PDI of infants of different age groups

PDI	Age	Control 0-6 month	Expt 0-6 month	Control 6-12 month	Expt 6-12 month	Control 12-18 month	Expt 12-18 month
Pretest	N	10	12	17	22	23	16
	Mean	90.7	86.75	88.94	90	86.26	87.12
	SD	15.84	14.66	10.96	9.58	9.46	8.58
Posttest	N	10	12	17	22	23	16
	Mean	89.5	92.08	86.52	96.63	83	90.87
	SD	7.83	11.01	4.48	7.27	3.6	3.61

Table 1: ANOVA

Source	Sum of squares	df	Mean square	F	CD
Test (A)	99.432	1	99.432	1.217 ^{NS}	
Group (B)	436.579	1	436.579	5.346*	2.09
Age (C)	563.135	2	281.568	3.448*	0.47
AB	648.408	1	648.408	7.939**	2.09
AC	39.759	2	19.879	0.243 ^{NS}	
BC	286.042	2	143.021	1.751 ^{NS}	
ABC	14.667	2	7.334	0.090 ^{NS}	
Error	15353.97	188	81.67		

*significant at 5% significance level

**significant at 1% significance level

NS: non-significant

Table 2: Mean MDI of infants of different age group

MDI	Age	Control 0-6 month	Expt 0-6 month	Control 6-12 month	Expt 6-12 month	Control 12-18 month	Expt 12-18 month
Pretest	N	10	12	17	22	23	16
	Mean	67.9	59.76	75.52	77.9	70.3	69.87
	SD	6.43	4.88	12.08	18.46	8.55	7.5
Posttest	N	10	12	17	22	23	16
	Mean	77.3	77.42	72.35	85.41	62	72.18
	SD	11.42	9.7	7.29	12.19	8.88	9.32

Table 2: ANOVA

Source	Sum of squares	df	Mean square	F	CD
Test (A)	824.864	1	824.864	7.108**	2.50
Group (B)	370.481	1	370.481	3.192 ^{NS}	
Age (C)	3466.726	2	1733.363	14.937**	1.77
AB	1116.297	1	1116.297	9.619**	2.50
AC	1907.981	2	953.99	8.221**	2.17
BC	988.1	2	494.05	4.257*	2.17
ABC	11.191	2	5.595	0.048 ^{NS}	
Error	21816.89	188	116.047		

*significant at 5% significance level

**significant at 1% significance level

NS: non-significant

The ANOVA (Table 1) shows significant main effect of group (control and experimental) and age (0-6, 6-12 and 12-18 months) and non-significant main effect of test (pre and post) on PDI. It was found from ANOVA (Table 1) that infants of 6-12 months age group had significantly higher PDI than infants of 12-18 months age group. It was interesting to know that in spite of increase in age the infants belonging to 12-18 months age group had lower PDI than the infants of 6-12 months age group. It may be due to the fact that after the birth of a new born till his first birthday an infant has been unknowingly stimulated by the mothers and other family members. They often play with the new member in the family. So, during first year of an infant he gets proper environment for his psychomotor development. But an infant after one year of age do not get the stimulating environment which should be provided to the infant for proper development of psychomotor development.

When the interaction effect of A (test) and B (group) was seen it was found significant at 1% significance level. On the basis of critical differences (CD) calculated it was observed that PDI of experimental group during post test were significantly higher than PDI of control group in post test. It showed that there was positive impact of multisensory stimulation on PDI of infants.

ANOVA (Table 2) indicated that the main effect of test (pre and post test) and age was found to be statistically significant at 1% significance level. In experimental group significant difference has been seen between pre and post test because of exposure to multisensory stimulation. Results also showed that with the increase in age there was gradual improvement in all the developments of infants. It was observed that infants belonging to 6-12 months age group of control and experimental group had significantly higher MDI than the other age groups during pre and post test. It may be because during these months the infants started to sit, crawl and move here and there. They try to explore the environment through various activities. But in spite of increase in age infants of 12-18 months had lower MDI than infants of 0-6 and 6-12 months. Babies as they advance chronologically they require more intensive stimulation which may be lacking in the activities given for the infants of experimental group. These stimulations may not be sufficient for the age group of 12-18 months.

When the interaction effect of A (test) and B (group) was seen it was found significant at 1% significance level. Critical difference (CD) showed that MDI of experimental group during post test were significantly higher than MDI of control group in post test. It may be because

there was positive impact of multisensory stimulation on MDI of infants.

The interaction effect of A (test) and C (age) was also found significant at 1% significance level. When critical differences were calculated it was found that infants of 12-18 months at post test level had significantly lower MDI among all the age groups. It is true that development takes place according to a certain sequence and with increase in age there is increase in all the developments. But it was found that in spite of increase in age there was no improvement in development as compared to other age groups. It was also found that during post test MDI of 12-18 months infants did not increase. Rather it was observed that MDI during pre test were significantly higher than post test in spite of providing stimulation to the infants. Low income level, low education, inadequate nutrition, lack of attention from parents, inadequate interaction with parents- all these factors have adverse influence on the mental development of infants. Divya and Ratnakumari (2007) also found that depriving child of stimulation and subjecting to an impoverished environment will retard his social, emotional and cognitive development.

When the interaction effect of B (group) and C (age) was seen it was found significant at 5% significance level. Critical difference showed that infants of 6-12 months and 12-18 months from experimental group showed significantly better performances in MDI than the infants of same age group from control group. It may be because of the exposure to multisensory stimulation to the experimental group.

CONCLUSION

Adequate stimulation during infancy is necessary for unfolding the inborn potentialities of infant. From the foregoing discussion it could be concluded that there was positive impact of multisensory stimulation on motor and mental development of infants. Significant age differences have been seen in Psychomotor Development Index (PDI) and Mental Development index (MDI) of infants. Impact of multisensory stimulation was more in 0-6 and 6-12 months infants. Enriched environmental experiences are associated with accelerated motor and mental development. Depriving a child of stimulation will retard his social, emotional and cognitive development.

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