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Development of Children during First 2 Years of Life

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ABSTRACT Development is not limited to growing big instead it consists of progressive series of changes of an orderly, coherent type towards the goal of maturity. The present study was done on 194 children on longitudinal basis over a period of two years with an objective to assess development of children, determine the age of attaining developmental milestones and identify factors affecting development. The results revealed that development has a great deal of variation for average age of attainment in various items of milestones. Majority of these ages are comparable to Indian values but for some items Kashmiri children are late attainers. However, this in no means indicates that they are abnormal children. The age range of achievement of all milestones lies within 3rd and 97th percentile values. Better initial birth weight (growth), gender difference (male child) and literate and working mothers along with appropriate weaning practices in children was advantageous for attainment of development milestones.

INTRODUCTION

Children are our most valuable, rather ultimate resource. The future of our country depends upon the investments we make for their holistic development. Children constitute 40 percent of the population and deserve their rightful share in development investments. The problem of infections and nutrition greatly affects this group. Both mortality and birth rates are high. While major epidemic diseases have been, by and large, eliminated as significant causes of death and ill- health among children, malnutrition lingers on as a silent killer behind-the-scene as a cause of death and disability affecting their growth and development.

Development, the maturation of function with age, is reflected by the sequential attainment of various milestones. Matching the formation of new synapses in the brain, increasingly complex skills are learnt starting from the more basic capabilities. Development depends on a variety of mutually interactive factors such as hereditary, environment, biological integrity, physical and psychosocial milieu and emotional stimulation. Normal development is a complex process and has a multitude of facets. However, it is convenient to understand and assess development under the following domains:

- gross motor development,
- fine motor skills development,
- personal and social development and general understanding,
- language, and
- vision and hearing (Ghai 2009)

Very few studies have been conducted on the patterns of growth and development during infancy. Studies conducted have been primarily of cross - sectional nature and mostly directed towards nutritional status only. By making observations at different intervals to assess rate of growth and development and by taking into account all possible factors in the child and his environment which might affect the future course of growth and development, one can make a reasonable prediction of his future progress.

Gutman and Feinstein (2007) found that mothers with higher levels of education and greater family income interacted more with their children, engaged their children in more outside activities, and provided more stimulation and teaching in the home environment. Parenting behavior was related to child developmental outcomes. Controlling for other observed factors it was found that the frequency of mother-child interactions was significantly related to higher scores for children's future fine and gross motor development. A more stimulating home environment was significantly related to higher scores on children's concurrent social and fine and gross motor development and the greater use of outside activities was significantly related to higher scores for children's concurrent and future social and fine motor development.

Spiegel and Halberda (2011) found that learning a new word is not an all-or-none process. Factors such as the delay between learning and test and the number or type of distracters presentall contribute to whether or not children

will demonstrate success during both the initial selection of the correct referent for a novel label and the retention of that mapping. In addition, the sensitivity of the outwardly observable behaviors used to operationally deûne success has a signiûcant impact on the ability to assess when learning has taken place.

Maternal education had a particularly marked effect on the relationship between parenting behavior and child development. In general the effect of parenting was stronger (that is, more positive) for children of mothers with low levels of education. However in home environments where mothers provided more stimulation and teaching, child development on all measures was generally higher, regardless of maternal education level or economic circumstance. All the development measures showed an increase across time as children matured from infants to young children, although development on all measures stabilized at some point between 30 to 42 months-of-age. This reflects the uneven nature of child development generally, with periods of progress in skill acquisition followed by periods of consolidation. Socio-economic characteristics such as income had varying relations with children's development. For the most part, these socioeconomic differences were small and diminished as children approached early childhood

Lamb (2012) found that the adjustment of children and adolescents is best accounted for by variations in the quality of the relationships with their parents, the quality of the relationship between the parents or significant adults in the children's and adolescent's lives, and the availability of economic and socio-economic resources. These process factors, rather than family structure, affect adjustment in both traditional and nontraditional families. The parents' sex and sexual orientation, like other characteristics of family structure, do not affect either the capacity to be good parents or their children's healthy development. There is also no empirical support for the notion that the presence of both male and female role models in the home promotes children's adjustment or well-being.

The observed differences from these studies are more a reflection of the environment which fosters particular kinds of skills within each area of development depending upon the needs and demands of competencies within that environment because of this, there is a need for separate norms for rural and urban children. In the background of what has been stated while introducing the subject, there seems to be scope and need for conducting further studies to analyze some aspects of growth and development of children during the first few years of childhood. The study has been undertaken in first two years of life amongst Kashmiri urban children.

Objectives

The main objectives of the study are detailed as under:

1. Assess some aspects of development in children.
2. Determine average ages of attaining different developmental mile-stones.
3. Identify factors influencing the development.

MATERIAL AND METHODS

The present study has been carried out over a period of 2 years on longitudinal basis with the aim to obtain empirical information about Kashmiri urban children on development in the first two years of life and compare it with that of other Indian children. One basic need that was fulfilled by conducting the present study was to obtain much needed development norms and patterns of Kashmiri urban children.

Sampling

A multistage purposive random sampling technique was used to select the urban children born to normal mothers without any evident medical problem likely to influence with development. The initial sample of 300-350 children was selected and followed up for 2 years. However moderate compliance to follow ups and data collection as per Performa (Schedule) designed especially for the purpose left with only 194 children for complete analysis and interpretation.

Method Used For Assessment of Development

Assessment of various items of development as described under DDST II's broad headings

of Gross- Motor, Fine- Motor, languages and Socio-personal. Some of the items contained in DDST II had to be dropped because it required keen personal observation. Simply leaving directions at home to record such items by surrogates (mothers/ fathers) would have been biased.

Tools Used (Testing Kit) For Development

Following items have been used for testing purpose:-

- Rattle- Yarn-Cubes-Ball,
- Pictures of cat, dog, bird, man and horse,
- Cup- Small bottle- Toy- Spoon –Raisin-Pencil-Copy and tooth brush.

Standardization

The various tests were discussed in detail beforehand and their assessment was first performed by the investigator with the help of a pediatrician and then applied on trial basis on some children for few days in presence of an expert (pediatrician). This exercise was repeated several times to become familiar with the use of test and passing of an item using the test. This also avoided intrapersonal variation. Once cleared by the expert (pediatrician) the test was applied by the investigator on randomly selected 20 children (outside the sample) to check the consistency. The whole exercise was done prior to actual start of testing of the study group. For collection of other information a predesigned, pretested schedule was used.

Testing Procedures for Development

Instructions given in the DDST II were strictly followed. The test was carried out during the home visit of the child in a conducive environment.

Follow- up

At the time of registration children were arranged in such a way that they made three separate cohorts for each month. Each cohort would accordingly get a turn for follow up after a gap of 3 months as per their turn. On an average twenty children were observed every week.

Certain number of children could not be followed because either they had changed their address or were out of station for more than six months. Some children or their parents were uncooperative for assessment of development. Four children died during 2 years period. The final sample left was only 194, who were regularly followed without much problem.

Analysis

Simple frequency analysis was done to group infants into various months in which they acquire various developmental milestones. The average ages with standard deviation for attaining milestones was also determined amongst children under study.

The analysis was further carried out to determine ages at which 25%, 50%, 75% and 90% of children would pass a particular milestones in the sample.

Impact of various socio- medical factors on the mean age of attaining a particular milestone was determined by applying test of significant (t- test). For this purpose randomly chosen items from four major categories were selected, since analysis on all items was not possible.

RESULTS AND DISCUSSION

The present study has analyzed children in four major groups of Gross Motor, Fine Motor, Languages and Socio-personal developmental milestones. Under Gross-Motor group 20 items were studied (Table 1), under Fine-motor 13 items (Table 2), in respects of Languages 15 items (Table 3) and for socio-personal 16 (Table 4) items were studied.

In gross-motor development, it was observed that the age of attainment of milestones was definitely late then the age of attaining the same milestones under Denver Development Screening Test (DDST). The usual age of ' lifting head' for a short span of time in first month viz., 0.78 ± 23 months and keeping 'head steady' at 3.79 ± 79 months was comparable to the reported Indian figures of 1-2 months and 4 months respectively. In respect of 'sitting without support' the age of achievement, that is, 6.83 ±1.17 months compared well with WHO-ICMR study and 'standing without support' at the age of 12.31± 1.50 months was also comparable to WHO-ICMR (1991) study.

On the whole, average age for attainment of Gross- Motor milestones were comparable to the age of attainment of milestones reported by

Table 1: **Average age of attaining gross motor milestones**

S. No.	*Milestones*	*Average age (in months) ± S.D*
1.	Lifts head	.78 ± .23
2.	Sits-head-steady	3.79 ± .79
3.	Bear wt on legs	4.44 ± 1.12
4.	Chest up arm support	4.00 ± .79
5.	Rolls over	3.79 ± .83
6.	Pulls to sit no head lag	5.01 ± 1.22
7.	Sits without support	6.83 ± 1.17
8.	Pulls to stand	9.73 ± 1.36
9.	Get to sitting	8.93 ± 1.36
10.	Stands holding or furniture	9.24 ± 1.43
11.	Stands 2 sec	11.09 ± 1.46
12.	Stands alone	12.31 ± 1.50
13.	Stoop and recover	13.14 ± 1.51
14.	Walks well	14.14 ± 1.66
15.	Walk backwards	16.73 ± 1.99
16.	Runs	17.87 ± 2.03
17.	Walk-up-steps	20.46 ± 2.61
18.	Kicks ball forward	19.63 ± 3.26
19.	Throws ball overhand	20.94 ± 3.35
20.	Jumps	23.60 ± 1.25

Table 2: Average age of attaining fine motor milestones

S. No.	*Milestone*	*Average age (in months)± S.D*
1.	Grasp rattle	4.06 ± 1.26
2.	Hands together	3.35 ± 0.74
3.	Regards raisin	3.99 ± 1.44
4.	Reaches objects	4.73 ± 1.24
5.	Looks for yarn	6.88 ± 1.36
6.	Rakes raisin	7.05 ± 1.43
7.	Pass cube	6.51 ± 1.26
8.	Takes 2 cubes	7.12 ± 1.82
9.	Thumb finger grasp	9.88 ± 1.60
10.	Bangs 2 cubes	10.95 ± 2.08
11.	Puts block in cup	12.82 ± 1.85
12.	Scribbles	16.51 ± 3.51
13.	Dumps raisin demonstrated	18.75 ± 3.81

Table 3: Average age for attaining socio-personal developmental milestones

S. No.	*Milestones*	*Average age (in months) ± S.D*
1.	Regards face	0.89 ± .22
2.	Smile	2.99 ± 1.03
3.	Regard own hand	3.20 ± .74
4.	Work for toy	7.88 ± 1.62
5.	Feed self	7.69 ± 1.99
6.	Play Pat-a-cake	13.52 ± 4.25
7.	Indicate wants	13.57 ± 2.07
8.	Wave bye-bye	13.10 ± 4.31
9.	Play ball with examiner	13.56 ± 2.20
10.	Imitate activities	14.61 ± 2.02
11.	Drinks from cup	14.61 ± 2.31
12.	Help in house	18.96 + 3.31
13.	Use spoon	19.20 ± 3.54
14.	Feed doll	18.77 ± 4.09
15.	Brush teeth with help	20.41 ± 3.27
16.	Wash hands	20.02 ± 2.89

Table 4: Average age of attaining language developmental milestones

S. No.	*Milestones*	*Average age (in months) ± S.D*
1.	Vocalizes	1.72 ± .44
2.	Oh Ah	1.83 ± .56
3.	Laughs	2.92 ± .55
4.	Squeals	3.18 ± .99
5.	Turns to rattling sound	4.24 ± 1.29
6.	Turns to voice	5.96 ± 1.21
7.	Single syllables	6.72 ± 1.01
8.	Imitate speech sounds	9.70 ± 1.37
9.	Dada/Mama non specific	8.87 ± 1.20
10.	Combine syllubles	8.02 ± 1.18
11.	Jabbers	9.36 ± 1.77
12.	Dada/Mama specific	10.79 ± 1.53
13.	Combine words	19.29 ± 2.32
14.	Body parts	20.60 ± 3.14
15.	Knows 2 actions	23.45 ± 1.75

Table 5: Comparison of 3rd and 97th centile values of few items of development

Milestones	*Present study*		*TDSC**	
	3rd	*97th*	*3rd*	*97th*
Social smile	1.2	5.5	0.1	2.7
Holds head steady	2.5	5.7	1.1	3.8
Rolls over	2.5	5.9	2.7	10.0
Turns head to rattle	2.5	6.4	3.0	5.8
Transfers objects hand to hand	6.03	9.96	4.1	7.0
Raises self to sitting	5.7	11.9	5.8	11.0
Stands by furniture	6.4	12.23	6.3	11.0
Pat-a-cake	7.37	21.01	6.7	12.7
Walks alone	11.4	18.5	9.9	17.7
Throws ball	16.2	23.93	9.5	16.7
Says 2 words	7.97	14.01	11.2	19.1
Walks backwards	13.91	23.75	12.2	19.5
Walks up stairs (without help)	15.70	23.87	12.2	24.4
Points to body parts	16.35	23.59	15.3	24.3

*TDSC = Trivandrum Developmental Screening Chart.

PBST. It was interesting to note that various gross motor milestones achieved in the first year of life.

Comparing the fine- motor milestones of the present study with DDST, it was again seen that kashmiri children attained most of the milestones little late than the ages reported in DDST and the mean age of attainment being almost similar to PBST values. However, the difference in the mean ages was fewer than Gross- Motor Milestones. The attempt to 'Grasp rattle' was at 4.06± 1.26 compared to 3.5 months and 'reaching an object' was at 4.73± 1.24 months compared to 4 months. In case of attempt to 'scribble' there was great age difference in attainment age,

that is, Kashmiri children scribbled at 16.5 ±3.51 months compared to age of 13.5 months.

With regard to socio-personal development, Kashmiri children attained milestones quite late in comparison to DDST but the ages still correspond to average age of attainment under PBST. Studies at AIIMS well baby clinic have shown that infants 'regards face' by one month and gave 'social smile' at the end of second month (Ghai 1993) which is comparable to the average age of Kashmiri children. In case of 'imitating activities', Kashmiri children are slightly late (14.6 ±2.02 months) compared to AIIMS (12 months).

In respect of languages milestones, the average age of attainment for different items appearing during first 12-15 months showed definite delay in Kashmiri children when compared with Indian studies. During second year of life most of the language milestones are comparable with the average ages seen amongst Baroda children. Once compared with western standards, there is no uniform pattern; some items are attained at earlier age whereas others are delayed. Kashmiri children 'vocalized' at 1.72 ± .44 months as compared to 1.4 months, 'turn head to rattle sound' by 4.24 ± 1.29 months in comparison to 3.9 months as reported by (Phatak and Khurana 1991). In case of saying *'Dada-Mama'* Kashmiri children achieve this milestone by 10.79 ± 1.53 months as compared to 9 months and utter two by 15.04 months in comparison to 14 months.

Comparison of age values for 3rd and 97th percentiles for different items of development with that of values (3rd and 97th percentile) reported by Simplified Baroda Development Screening Test popularly known as TDSC ; it was observed that there is mixed pattern of age range for some of these items. Kashmiri children had similar age pattern of (3rd and 97th) percentile values for different items attained up to first 6 months and thereafter there was difference in age for attaining these development milestones (Table 5). In some items Kashmiri children are early starters with an age shift to the left while in other developmental items Kashmiri children are late starters and there is an age shift to the right.

The age at which a given percent of population can pass an item showed large variation for their attainment in the present study. When compared to one of the western study (Frankenburg et al. 1992) it was observed that in certain items the age at which 25% of Kashmiri children could pass an item, at the same age comparatively 75% to 90% of Western children could pass these items, thereby confirming that Kashmiri children definitely attain milestones at a later age than Western children. In few items one could see that the age at which 50% of Kashmiri children had passed a test, it corresponded to the age at which 90% of the Western Pattern could pass the same test, in the initial few months, percentage of children passing a particular item at a given age was comparable to Western study, yet later on it took them more in terms of age to attain the next item.

The data further gives a rough pattern of group differences revealing that if the mean age of passing 25 percent children verses 75 percent passing is compared with this study with that of Western study, a difference of one month to one and half months age could be observed in the items attained in first year and the difference goes to 2 months in items attained in next 6 months and nearly reached to 2-3 months for other items.

The data was further analyzed in relation to various socio- medical variables, to see if there is any impact of these factors on the average age of attainment of randomly chosen few developmental milestones from Gross- Motor, Fine Motor, Language and Socio- personal.

At the outset it was seen that the males in most of the "motor milestone' were early attainers than females although only 2 milestones showed statistical significance, that is, 'chest-up-arm support' and 'kicking of ball forward'. With regard to 'language' and 'socio-personal' milestones girls were early attainers but the difference did not proved to be significant statistically. However, in case of ' fine motor' milestones males achieved some items, that is, 'reaching objects', 'regarding raisin', 'taking raisin' and 'dumping raisin' earlier than the females, while as females were early attainers with respect to 'grasping rattle', 'hands together', 'passing cube', 'thumb finger grasp', 'scribbling' and ' looking for yarn'. But these differences were insignificant.

With regard to literacy status of mother it was found that children of literate mothers had attained various milestones in Gross Motor, Fine Motor, Languages and socio-personal groups earlier than the children of illiterate mothers. The differences in the mean values were sig-

nificant except for items like ‘ kicking ball forward’, ‘ drinking form cup’ and ‘ using spoon’.

In relation to feeding and weaning it was interesting to note that children whether breast fed or artificially fed had no difference in attaining the milestones. However, those weaned at an appropriate age had attained milestones earlier than those who had delayed weaning and these difference were significant statistically except for the item ‘ drinking from cup’, where the difference was insignificant, although the children with appropriate weaning age did attain the milestone earlier.

The children belonging to working mothers showed mean age of attainment of some of the milestones significantly earlier, whereas other items were attained little later. The significantly different items attained earlier were ‘ standing Momentarily’, ‘Walking Well’, “ Laughing’, ‘Turning To Voice’, ‘ *Dada Mama*’, ‘Grasping Rattle’, ‘Hands Together’ and ‘ Feeding self’ and others were insignificantly different, although most of the milestones were attained earlier by children of working mothers.

In relation to birth order it was mainly the motor milestone and the socio- personal milestone which showed significant earlier mean age of attainment amongst the first and second birth order compared to the later birth orders. The initial birth weight had significant impact on attainment of most of the milestones especially children with > 20.8 kgs of birth weight whose age of attainment was much earlier than children born with birth <2.8 kgs and the maximum delay in attainment of various milestones was among the children born with birth weight <2.5 kgs.

Further, it was observed that income did not play any significant role in achieving various developmental milestones. The mean ages between different income groups with respect to attainment of Gross- Motor, Fine–Motor, Language and Socio-Personal development were hardly different to each other.

CONCLUSION

The development has shown a great deal of variation for average age of attainment in various items of milestones. Majority of these ages are comparable to Indian values but for some items Kashmiri children are late attainers. However, this in no means indicates that they are abnormal children. The age range of achievement of all milestones lies within 3rd and 97th percentile values. Better initial birth weight (growth), gender difference (male child), literate and working mothers along with appropriate weaning practices in children was advantageous for attainment of development milestones.

RECOMMENDATIONS

To improve and sustain better growth and development of Kashmiri children it is recommended that better ante-natal and post- natal services with improved child caring and rearing practices coupled with maternal sensitization to child’s physical and psychological needs through better home environment with learning opportunities and improvement in female literacy would go a long way in improving the growth and a development of these children. This involves a multi-disciplinary approach of improving health care services, empowering women, encouraging female literacy and improving socio- economic status through integrated program directed towards mother and children. Extension services form home science department can play an important role in planning, organizing, and implementing various activities/ programmes directed in this direction.

LIMITATIONS

The researcher had to face a number of difficulties while collecting data. Prevailing conditions in the valley proved to be at times a hindrance in collecting data. Mothers of children, especially illiterate ones, were not very co-operative and were occasionally reluctant to allow the investigator to take measurements especially the weight of child or test a developmental milestone. It needed lots of persuasion and motivation on the part of the investigator to overcome the wrong beliefs and taboos attached with weighing or testing milestone in a child. The reason for drop out in some cases was attributed to this fact.

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