# To study and compare behavioral and developmental aspects in healthy urban children less than 2 years and related factors.

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**ABSTRACT** *A total of 100 normal urban babies were given tests to assess their behavioural development as devised by Gesell. They were examined at key ages 40 weeks, 12 months, 18 months and 24 months (± 1 week). Equal number of children were taken at each key age. Age of each child was assessed precisely. Attempts were made to compare the behavioural development with American children. Influence of social and nutritional status on behavioural development were studied. A large number of children showed an above average performance in all four fields of behavior. The performance in advance was most apparent in the field of adaptive development followed by motor, personal-social and language behavior. Personal social and language development appeared to be related to social class. No correlation appeared to exist between nutritional status of a child and his behavioural development.*

## INTRODUCTION

Childhood, beginning from the neonatal period to the termination of puberty carries the individual from a condition of complete biological helplessness to the threshold of self dependence and creative activity. Paediatrics has entered into a new era in various other areas of which developmental paediatrics is one. This is a form of clinical medicine which is systematically concerned with the diagnosis and supervision of child development. This field of paediatrics has great implications for the social aspects of medicine.

Behaviour patterns are not whimsical or accidental by-products. They are the authentic end-products of a total developmental process which works with orderly sequence. They take shape in the same manner that the underlying structures take shape.

In 1925, Gesell[1] put forth his developmental schedules. Gesell (1946)[1] stressed the importance of clinical appraisals, which were not always identical with the developmental quotients. He said that these interpretive clinical judgments have more significance than the raw quotients in investigating the constancy and stability of mental growth careers.

Constancy of mental test performance is never achieved at any age level, but that the variations are greater if the first test is in the preschool period. This point has been borne out by Terman (1919)[2] Hildreth (1926)[3], Honzik (1938)[4] and Bayley (1933)[5]. Bayley (1950)[6] concluded that scores made before months are entirely useless in the prediction of school age abilities. Illingworth (1961)[7] opined that there will never be a high correlation between tests in infancy and those in later childhood, except in the case of mental subnormality.

Knobloch and Pasamanic (1960)[8] stated that "which an adequate infant examination is used as a clinical neurologic method by a physician trained in its use, it is as effective a predictor as any psychologic examination done at three to seven year intervals. Their impression seems to be that changes, up or down, from the infant IQ test are the result of social learning, profoundly dependent on socioeconomic circumstances.

Bayley's (1943)[9] correlation studies of parent-education scores and infant test scores revealed that the relationship does not appear until the second year of life. It should be emphasized that it is not so much the specific tutelage which the parents given the child which facilitates or impades his mental development (and depresses intelligence test score). Rather, it is the total climate in which he grows; the tolerance for his activity; rewarding his curiousity;

receptivity to his early verbalizations; assistance in coping with frustrations and delays in gratification; and encouragement of his moving from magic to realistic modes of thought.

Kamat[10] (Bombay Karnatak Revision) (Gujrati Revision) is the revised form of the Binet Simon Tests. A study on behavioural development in pre-school children has been carried out at Indore by Duggal (1960)[11]. Das and Sharma (1973)[12] in their longitudinal study Patel and Kaul (1970)[13] on 200 normal infants. Examined as per schedule recommended by Gesell[1]. Infants tested exhibited levels of developmental maturity in advance of American babies.

The plan of examination, test material and technique employed correspond to the one recommended by Arnoid Gesell and his co-workers[1].

### Aims and objectives

1. To study development by using the Gesell's[1] scale in respect of Motor, Adaptive, Language and Personal-social behavior in 100 well nourished healthy urban children in Jabalpur corresponding in weight to over 3rd Harvard percentile.

2. To compare observations made in this study with those of American Children in each of the four areas of behavior and to see how far our infants conform to, are in advance or are behind their American counterparts in each of the four fields at each of four key ages.

3. To discuss the patterns observed in the light of socio-economic, cultural, nutritional and other environmental conditions prevailing in this region.

### Material and Methods

A total of 100 normal urban babies were given test to assess their behavioural development as devised by Gesell[13]. They were examined at key ages 40 weeks, 12 months, 18 months and 24 months (± 1 week). Care was taken to include only those who were at least above the 3rd Harvard percentile, the range being third to 97th percentile (except one child who was above the 100th percentile).

- Accurate age calculated from the date of birth with the help of a calendar of the period concerned.
- Socio-economic class according to Central Statistical Organization, Government of India (1962).
- Physical examination
- Developmental examination (a) Preliminary interview (b) Formal behavior tests (c) Record of the results.

**Record of the Result:** After completion of the examination the child's performance was scored on the developmental schedule. The appropriate developmental schedule was used pertaining to the key age of the child. The behavior items were then checked in terms of the child's performance. In scoring any behavior pattern, the following procedure was followed:

Performance:                         Sign used while scoring

1. Schedule of a given behaviours        + (plus sign)
2. If the behavior pattern on
The schedule was not represented
In the child's behavior
(a) If relating to permanent          - (minus sign)
    Pattern
(b) If relating to temporary          ++ (double plus)
    Pattern

Interoretation
- (Plus sign) against a pattern - Child displayed pattern
- (Double Plus)                 - Child displayed a more nature pattern
- (Minus)                       - Note mature enough for the particular Pattern

The performance of a child individually on each of the four behavior patterns (Motor, Adaptive, Language, Personal-social) and his overall performance was then scored

(a) Below-average (b) average (c) above-average (d) superior

This was done on the basis of accumulative impression in each field of behavior.

## Observation and result

Table I
Age and Sex Distribution of Babies studied

| Key ages | Male | Female | Total |
|---|---|---|---|
| 40 weeks | 12 | 13 | 25 |
| 52 weeks | 20 | 5 | 25 |
| 18 months | 10 | 15 | 25 |
| 24 months | 12 | 13 | 25 |
| Total | 54 | 46 | 100 |

Table-II
Distribution of Babies according to nutritional status

| Percentile (Harvard) | 40 weeks | 52 weeks | 18 months | 24months | Total |
|---|---|---|---|---|---|
| Above 3rd but below 25th | 10 | 10 | 9 | 16 | 45 |
| 25th-75th | 11 | 13 | 16 | 8 | 48 |
| Above 75th | 4 | 2 | 0 | 1 | 7 |
| Total | 25 | 25 | 25 | 25 | 100 |

Table-III
Social Classification

| Social Class | 40 weeks | 52 weeks | 18months | 24months | Total |
|---|---|---|---|---|---|
| Class I | 13 | 17 | 10 | 12 | 52 |
| Class II | 9 | 1 | 9 | 7 | 26 |
| Class III | 3 | 7 | 6 | 6 | 22 |
| Class IV | 0 | 0 | 0 | 0 | 0 |

Table-IV
Behavioural performance of Babies in the four fields of development

| | Below average | Average | Above-average (above-average) + superior | Total |
|---|---|---|---|---|
| Motor | 9 | 39 | 52 (33+19) | 100 |
| Adaptive | 8 | 34 | 58 (43+15) | 100 |
| Language | 16 | 47 | 37 (22+5) | 100 |
| Personal social | 12 | 53 | 35 (31+4) | 100 |

Table-V
Motor behaviour at various key ages

| Key age | Below average | Average | Above average (above-average + superior) | Total |
|---|---|---|---|---|
| 40 weeks | 4 | 12 | 9 (7+2) | 25 |
| 52 weeks | 2 | 7 | 16 (10+6) | 25 |
| 18 months | 1 | 9 | 15 (6+9) | 25 |
| 24 months | 2 | 11 | 12 (10+2) | 25 |
| Total | 9 | 39 | 52 (33+19) | 100 |

Table-VI
Adaptive behaviour at various key ages

| Key age | Below average | Average | Above average (above-average + superior) | Total |
|---|---|---|---|---|
| 40 weeks | 2 | 7 | 16 (13+3) | 25 |
| 52 weeks | 1 | 5 | 19 (10+9) | 25 |
| 18 months | 0 | 11 | 14 (11+3) | 25 |
| 24 months | 5 | 11 | 9 (9+0) | 25 |
| Total | 8 | 34 | 58 (43+15) | 100 |

Table VII
Language behaviour at various key ages

| Key age | Below average | Average | Above average (above-average + superior) | Total |
|---|---|---|---|---|
| 40 weeks | 7 | 14 | 4 (3+1) | 25 |
| 52 weeks | 2 | 19 | 4 (4+0) | 25 |
| 18 months | 6 | 8 | 11 (7 +4) | 25 |
| 24 months | 1 | 6 | 18 (8+10) | 25 |
| Total | 16 | 47 | 37 (22+15) | 100 |

Table VII
Personal-social behaviour at various key ages

| Key age | Below average | Average | Above average (above-average + superior) | Total |
|---|---|---|---|---|
| 40 weeks | 1 | 14 | 10 (8+2) | 25 |
| 52 weeks | 3 | 18 | 4 (4+0) | 25 |
| 18 months | 2 | 14 | 9 (8+1) | 25 |
| 24 months | 6 | 7 | 12 (11+1) | 25 |
| Total | 12 | 53 | 35 (31+4) | 100 |

Table-IX
Relationship of above average performance to social status

| | Class I | Class II | Class III | Class IV | Total |
|---|---|---|---|---|---|
| Motor | 31 (59.61) | 9 (17.30) | 12 (23.07) | 0 | 52 |
| Adaptive | 33 (56.90) | 11 (19.00) | 14 (24.14) | 0 | 58 |
| Language | 22 (59.46) | 9 (24.32) | 6 (16.22) | 0 | 57 |
| Personal social | 20 (57.11) | 10 (28.57) | 5 (14.30) | 0 | 35 |

Table X
Relationship of average performance to social Class

| | Class I | Class II | Class III | Class IV | Total |
|---|---|---|---|---|---|
| Motor | 14 (36.00) | 17 (43.60) | 8 (20.50) | 0 | 39 |
| Adaptive | 16 (47.00) | 13 (38.23) | 5 14.70) | 0 | 34 |
| Language | 24 (51.00) | 10 (21.27) | 13 (27.70) | 0 | 47 |
| Personal social | 25 (47.20) | 14 (26.40) | 14 (26.40) | 0 | 53 |

Table XI
Relationship of below average performance to social class

|  | Class I | Class II | Class III | Class IV | Total |
|---|---|---|---|---|---|
| Motor | 7 (77.77) | - | 2 (22.22) | 0 | 9 |
| Adaptive | 3 (37.50) | 2 (25.00) | 3 (37.50) | 0 | 8 |
| Language | 6 (37.50) | 7 (43.70) | 3 (18.75) | 0 | 16 |
| Personal social | 7 (58.30) | 2 (16.66) | 3 (25.00) | 0 | 12 |

Table XII
Relationship of below average performance to nutritional status

|  | 3 to 24 | 25 to 74 | 74 and above |
|---|---|---|---|
| Motor | 17 (37.77) | 33 (68.75) | 2 (28.57) |
| Adaptive | 20 (44.45) | 32 (66.66) | 5 (71.43) |
| Language | 15 (33.33) | 21 (43.75) | 1 (14.30) |
| Personal social | 14 (31.11) | 18 (37.50) | 3 (43.00) |
| Total | 45 | 48 | 7 |

Table- XIII
Relationship of average performance to nutritional status

|  | 3 to 24 | 25 to 74 | 74 and above |
|---|---|---|---|
| Motor | 24 (53.35) | 12 (25.00) | 3 (42.86) |
| Adaptive | 19 (42.22) | 13 (27.08) | 2 (28.57) |
| Language | 21 (46.66) | 22 (45.83) | 4 (57.14) |
| Personal social | 26 (57.77) | 23 (48.00) | 4 (57.14) |
| Total | 45 | 48 | 7 |

Table-XIV
Relationship of below average performance to nutritional status

|  | 3 to 24 | 25 to 74 | 75 and above |
|---|---|---|---|
| Motor | 4 (8.88) | 3 (6.25) | 2 (28.57) |
| Adaptive | 6 (13.33) | 3 (10.41) | - |
| Language | 9 (20.00) | 5 (10.41) | 2 (28.57) |
| Personal social | 5 (11.11) | 7 (14.58) | - |
| Total | 45 | 48 | 7 |

## DISCUSSION

For purpose of this study a total of 100 normal urban babies were given tests to assess their behavioural development as devised by Gesell. They were examined at key ages 40 weeks, 12 months, 18 months and 24 months (± 1 week). Care was taken to include only those who were at least above the 3rd Harvard percentile, the range being 3rd to 97th percentile (except for one child who was above 100th percentile). Harvard figures were employed to ensure that comparability in respect of physical growth was achieved as far as possible since a comparison of behavioural development was to be made with American children on the Gesell's scale of development. Calculating the age from the date of birth with the help of a calendar of the period concerned.

The performance of each baby was assessed and graded as 'average', 'below-average' and 'above average'. An analysis of the behavioural performance of babies in the four fields of development revealed an above-average performance by a large number of children. The maximum number (58 percent) of above average performers was in the adaptive field. A nearly equal number (52 per cent) showed above average performance in the motor field. With respect to the language and personal social development the proportion of children showing a higher performance was 37 and 35 percent respectively. Patel and Kaul (1970)[14] in their study showed that infants in this region are generally in advance of their western counterparts in all four major fields of behavior. The performance in advance was most apparent in the field of motor development followed by language, personal-social and adaptive behavior. A similar observation of superior performance by Indian babies has also been made by Phatak et al (1969)[15], Kandoth (1971)[16] and coworkers by Das and his associates[12] (1973). Personal social development is largely based on environmental influences. A child from a higher social class gets more opportunities to explore the environment. A child from a lower

social class infrequently wears shoes and clothes worn often consist of a vest or a shirt only. Thus dressing activities tested under personal social behavior get a low score.

Similar observations have been made by Patel and Kaul (1970)[14]. However, Fernando and Gomes (1961) from Colombo believe that earlier achievement of developmental mile stones is attributable to lighter weight and therefore easier manoevrability of children observed by them. Das and co-woerkers (1973) [12] in their longitudinal study found that children who were relatively lighter in weight tended to walk earlier than their counterparts weighing more, but the reverse was observed thereafter, i.e. heavier children were found to be distinctly ahead in attainment of motor developmental mile stones e.g. climbing stairs, throwing a ball over the head and hopping on one foot. This they believe is due to the fact that these motor milestones are more complex manouvres which may require an apparently greater degree of muscle bulk and strength. The infant is the product of his innate endowment i.e. his nature and the influence of environment i.e. his nurture. Hereditary factors come into play prior to birth but continue to influence growth throughout life. Environment is a factor which must be continually studied in connection with hereditary forces.

While on the one hand Knobloch and Pasamanic[8] (1960) believe that intelligence test scores are a result of social learning formally dependent upon socio-economic circumstances, on the other hand it is also believed that such factors have little influence on development during the first 12-15 months. If this latter statement were to be accepted it would be extremely difficult, if not impossible, to explain the developmental maturity exhibited by infants in this region in advance of those studied by Gesell[17] in American children.

With respect to the relationship to social class it was observed that majority of children with an above average performance in all the fields of behavior belonged to Class I. With respect to the below average performers again the majority of babies were from social class I. Wider scatter in class I. In the present study, no relationship appeared to exist between the level of performance and the nutritional status of children. Thus experience gained from the present study conforms that infants in this region are generally in advance of their western counterparts (Gesell) in all four major fields of behavior. The performance in advance is most apparent in the field of adaptive development followed by motor, language and personal social behavior. Language and personal social behaviour appeared to be related to social class. Development of the infant after birth is governed by the family atmosphere, child tgraining, the social milleu and economic factors. In contrast to their western counterparts babies in this region seem to have plenty of company. They are frequently picked up, cuddled, adored, talked to, played with by the mother, siblings, grand parents, neighbours and so on.

Another logical explanation for advanced developmental maturity in our infants, could be a difference in the genetic potential or some other factor operating during intrauterine life which determines the difference in developmental maturity of one ethnic group from another.

### Conclusions

A total of 100 normal urban babies were given tests to assess their behavioural development as devised by Gesell. They were examined at key ages 40 weeks, 12 months, 18 months and 24 months (± 1 week). A deliberate attempt was made to study equal number of children at each key age in order to facilitate comparison of their performance. Care was taken to include only those who were at least above the 3rd Harvard percentile, the range being third to 97th percentile. Most children were in the 25th to 75th Harvard percentile. Harvard figures were employed to ensure comparability in respect of physical growth. No efforts were spared to assess the age of the child precisely. This was done by calculating the age from the date of birth with the help of a calendar of the period concerned. Performance of each baby was

assessed and graded as 'average', 'below-average' and 'above average'.

An above average performance was observed in a large number of children. The maximum number (58 percent) of above average performers was in the adaptive field. A nearly equal number (52 percent) showed a superior performance in the motor field. With respect to the language and personal social development the proportion of children showing a higher performance was 37 and 35 percent respectively.

With respect to relationship of behavioural performance to social class it was observed that majority of children with an above average performances in all the field of behavior belonged to class I. Language and personal social behavior appeared to be related to social class since the proportion of children with an above average performance in the above two fields decreased in lower social class. However, with respect to the below average performers again the majority of babies were from social class I. Thus there was a wider scatter in class I. No relation appeared to exist between the level of performance and the weight of the children studied.

To conclude it is further confirmed that developmental maturity is definitely in advance in Indian children, in all four fields of behavior. Lightness and manoevrability do not appear to be responsible. Other factors such as intrauterine environment, race, upbringing, emotional contact with adults and mother child relationship etc. need to be defined and studied.

## SUMMARY

1. A total of 100 normal urban babies were given tests to assess their behavioural development as devised by Gesell.

2. They were examined at key ages 40 weeks, 12 months, 18 months and 24 months (± 1 week). Equal number of children were taken at each key age. Age of each child was assessed precisely.

3. Attempts were made to compare the behavioural development with American children.

4. Influence of social and nutritional status on behavioural development were studied.

5. A large number of children showed an above average performance in all four fields of behavior. The performance in advance was most apparent in the field of adaptive development followed by motor, personal-social and language behavior.

6. Personal social and language development appeared to be related to social class.

7. No correlation appeared to exist between nutritional status of a child and his behavioural development.

**References:**

1. Gesell, A., Amatruda, C.S.: Developmental diagnosis normal and abnormal child development, Hoeber Medical Division, Harper and Row Publishers, 2nd Edn. 1962.
2. Terman, L: The Intelligence of School Children. Boston, New York, Houghton Mifflin, 1919.
3. Hildreth. G.: Stanford-Binet retests of 441 school children. J. Genet. Psychol. 33:365, 1926.
4. Honzik. M.P.: The constancy of mental test performance during the preschool period. J. Genet. Psychol. 52: 285, 1938.
5. Bayley, N.: Mental Growth during the First Three Years. Genet. Psychol. Monogr. 14, 1, 1933.
6. Bayley. No.: On the growth of intelligence. Amer. Psychol. 10; 12, 1955.
7. Illingworth, R.S.: The predictive values of development tests in the first year; with special reference to the diagnosis of mental subnormality J. Child Psychol. Psychiat. 2: 210, 1961.
8. Knobloch. H., Pasamanic. B.: Environmental factors affecting human development before and after birth. Pediatrics. 26; 210, 1960.
9. Bayley.N.: Mental growth during the first three years in child behavior and development; Edited by Barker, Kounin, and Wright. New York, Mcgraw Hill, 1943, Chap. 6.
10. Kamat, V.V.: Measuring intelligence of Indian children Geoffrey Cumberlege, Oxford Uni. Press, Bombay.
11. Duggal.A.: Behavioural development in pre-school group of children in Indore. A Thesis submitted for the degree of Doctor of Medicine (Paediatrics) Vikram University, 1960.
12. Das, V.K. and Sharma, N.L.: Developmental mile stones in a selective sample of Lucknow children- a longitudinal study. Indian Jour. Of Paed. Jan. 1973, 40: 300, P.1-7.
13. Gesell. A.: The ontogenesis of infant behavior; in manual of child psychology: edited by Leonard Charmichael. New York, Wiley, 326, 1946.
14. Patel, N.V. & Kaul, K.K.: Behavioural growth pattern in the first year of life. Thesis submitted for the degree of Doctor of Medicine (Paediatrics) University of Jabalpur, 1970.
15. Pathak. P.: Motor and mental development of Indian babies from 1 month to 30 months. Indian Paediatrics 6: 18, 1969.
16. Fernando, P., Gomes. W.J.: The pattern of growth and development in infants in Colombo and factors affecting them: Asian Pediatrics. The Scientific proceedings of the first All-Asian Congress of Paediatrics, New Delhi, Jan. 1961.
17. Gesell. A.: The mental growth of the preschool child, New York, Macmillan, 1925.