

## FOLLOW-UP STUDY OF ONE HUNDRED AND SEVEN SMALL FOR DATE BABIES\*

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In 1948, World Health Assembly categorically showed that the small babies are the major cause for infant mortality. Babies having birth weight 5 lbs. 8 oz (2.5 Kg.) or less were termed as premature. It was found that some of these babies weighing 2.5 Kg. or less at birth born at term, are less handicapped than the remaining ones born before 37 weeks. So the gestation period, less than 37 weeks was considered as the other criteria for prematurity.

Further study revealed that, of the babies, weighing 2.5 Kg. or less at birth, all were not necessarily born before term (e.g. 37 weeks)—some of them were born at term or even post-term. So it is obvious that the International definition included many small babies who were not born prematurely. As such the Maternal and Child Health (W.H.O.) in 1961 (Mary Crosse, 1966) recommended its preference to the term 'low birth weight'. 'Any infant whose birth weight is below the tenth percentile for the gestational age'

is now considered as 'small-for-date' (Lubchenco *et al* 1963).

Purpose of the present study is—(1) to determine the growth and development of these babies and (2) the factors contributing to complications during their development.

### Material

One hundred and seven 'small-for-date' babies were studied and followed up at the "Baby Follow Up Clinic" of Eden Hospital, Medical College, Calcutta with joint collaboration of the Paediatric Department and Obstetrics and Gynaecology Department of that College.

Present study includes 107 cases, whose average birth weight was 2.2 Kg. and length was 46.61 cm. Amongst these, 50 cases were weighing less than 2.3 Kg. and their average weight was 2.1 Kg. and average length 46.18 cm. Of the total number 48 were male babies whose average birth-weight and length were 2.3 Kg. and 46.63 cm. respectively, and 59 were female babies whose birth-weight and length were 2.27 Kg. and 46.28 cm. respectively.

### Methods

Initial follow-up study for one year during the period 1972-73 was carried on at the follow-up clinic. The yearly delivery in this hospital is about 8,000 to 10,000 and the average birth-weight of

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these babies is 2.72 Kg. and length 50.80 cm. About 10 to 15 per cent of these babies turned up at the Baby Follow-up Clinic at a certain period mostly at their parental convenience. Of these 107 babies who were considered to be small babies weighing 2.5 Kg. and below, were selected for study. The obstetrical history of these cases as far as possible during their retrospective study was gathered. These study included their physical growth and development as regards behaviour, mental condition, physical examination and socio-economic condition, pregnancy complication and gestational age.

#### Analysis of Data

**Duration of Pregnancy:** Duration of pregnancy or gestation period were calculated from the last menstrual period, as told by the mother. According to these 95 of the 107 babies were born in between 37 to 40 weeks. Eleven cases were born before term, of which 6 were within 32 to 34 weeks and 5 were at 36 weeks and one was born at 43 weeks.

**Maternal Factors:** These might have some influence on the growth of the foetus.

Mothers on the whole in these groups came from middle class and lower middle class Bangalee families. Their average weight and height were less than that of the mothers of the other parts of Northern India (Dutta-Banik *et al* (1968) and also markedly lower than that of Western countries (Love and Kinch 1965). Their socio-economic standards as regards food habits, monetary condition and housing were inferior to those of the affluent class of people. On the whole the average weight and length of their babies were expected to be lower. In this series, young mother and primipara were the predominant features.

**Maternal Age:** Seventy five young mothers of the age group between 16 to 25 years gave birth to small babies in respect to their gestational age; whereas 32 babies were born to mothers of age group of 26 to 35 years.

**Parity:** On considering parity it was found that the primiparae predominate the picture. The distribution of age and parity in relation to the nature of deliveries is depicted in Table I.

TABLE I  
The Distribution of Age and Parity in Relation to the Nature of Delivery

Para: 0+0	66 cases:	1. Younger Group	— 56	(a) Normal delivery: 50
				(b) Abnormal delivery: 6
		2. Elderly Group	— 10	(a) Normal delivery: 2
				(b) Abnormal delivery: 8
Para: 1+0	22 cases:	1. Younger Group	— 15	(a) Normal delivery: 12
				(b) Abnormal delivery: 3
		2. Elderly Group	— 7	(a) Normal delivery: 2
				(b) Abnormal delivery: 5
Para: 2+0	11 cases:	1. Younger Group	— 7	(a) Normal delivery: 2
				(b) Abnormal delivery: 5
		2. Elderly Group	— 4	(a) Normal delivery: 0
				(b) Abnormal delivery: 4
Para: 3+0	4 cases:	1. Younger Group	— 1	(a) Normal delivery: 1
				(b) Normal delivery: 3
		2. Elderly Group	— 3	(a) Normal delivery: 3
				(b) Normal delivery: 0
Para: 4 & 5+0	4 cases:	Elderly Group	— 4	(a) Normal delivery: 3
				(b) Abnormal delivery 1*

\* Caesarean section for antepartum haemorrhage.



Table I shows that 61.4 per cent were primipara, 20.5 per cent were para 2, 10.2 per cent were para 3 and 3.7 per cent belonged to para 4 or more.

The abnormal deliveries were noted more in 26 years and onwards.

Relevant past and present obstetric history with foetal outcome has been shown in Table II.

TABLE II  
*Obstetric History With Foetal Outcome*

	No. of cases
1. History of Abortion only	1
2. Still-birth	1
3. Abortion and still-birth	1
4. History of death of previous child and neonatal death in previous issue	5
5. Congenital abnormalities in previous children	1
6. Antepartum haemorrhage at the present pregnancy	2
7. Pre-eclamptic toxæmia in the present pregnancy	1
8. Congenital abnormality (Present Pregnancy) responsible for low birth-weight	1
9. Hydramnios	1

**Mode of Delivery:** Eight babies were delivered normally and were of vertex presentation. Of the remaining 27 babies delivered normally, 15 were delivered by lower uterine caesarean section, 6 by forceps, 5 by breech extraction and only 1 by Ventouse method.

Apart from 2 cases of A.P.H., most of these Caesarean sections were performed in elderly primiparae.

#### *Perinatal Complications*

Detailed history of perinatal complications was not available as these were retrospective studies but some informations were collected as follows:

(i) Minor degree of resuscitative measures were needed in 3 cases such as, Oxygen inhalation, intravenous dextrose

and sodi-bicarb administration as they were asphyxiated.

(ii) History of neonatal jaundice was present in 6 cases, but they were neither due to any incompatibility nor did they need any treatment.

(iii) The baby who was born at 48 weeks, was heavily meconium stained.

(iv) In one child, isolated ventricular septal defect (V.S.D.) was noted.

(v) In 2 other cases congenital laryngeal stridor were present.

Follow up Examinations of the babies were considered in the following patterns:

Measurement of growth parameters, screening developmental tests and general physical examinations including history of illness.

**Growth Parameters:** Average weight and length of 107 babies at birth were 2.28 Kg. and 46.61 cm. respectively. Subsequent growth parameters viz. weight in Kg., length in cm. head circumference in cm. and chest circumference in cm. are given in Table III.

Male babies were 2.30 Kg. by weight and 46.63 cm. by length at birth whereas, the females babies were 2.27 Kg. and 46.60 cm. respectively.

In comparing the growth parameters at birth, the difference in boys and girls seemed to be very little but it was seen that the boys subsequently surpass the girls in all measurements at one year. Some of these growth parameters are discussed here:

(i) **Weight** in boys and girls at 4th, 8th, 12th, 24th, 36th and 52nd weeks were—2.97-2.50; 3.92-3.72; 4.56-3.99; 6.65-5.85; 7.51-7.00; 8.80-7.50 Kgs. respectively.

(ii) **Length** in boys and girls at 4th, 8th, 12th, 24th, 36th and 52nd weeks were—51.64-49.96; 53.55-55.37; 55.09-



TABLE III

"Small for Date" Babies: Their Average Weight, Length, Head Circumference and Chest Circumference from Birth to One Year of Life

Age	Weight in Kg.	Length in cm.	Head circumference in cm.	Chest circumference in cm.
At birth	2.28	46.61	—	—
Weeks 2	2.33	48.89	28.94	26.66
Weeks 4	2.78	49.17	33.68	30.64
Weeks 6	3.74	52.21	34.10	34.69
Weeks 8	3.82	53.50	35.51	35.59
Weeks 12	4.27	56.51	37.34	37.38
Weeks 16	4.74	58.42	38.12	39.37
Weeks 20	5.66	59.69	39.88	40.39
Weeks 24	6.24	60.96	40.39	40.64
Weeks 28	6.67	63.50	41.91	42.25
Weeks 32	7.05	63.75	42.68	43.18
Weeks 36	7.15	66.04	43.18	43.81
Weeks 40	7.52	68.58	43.81	44.08
Weeks 44	7.75	69.50	44.30	45.50
Weeks 48	7.90	70.80	44.60	46.00
Weeks 52	8.10	71.6	44.80	46.50

55.88; 64.29-59.94; 68.58-66.90; 71.50-70.40 cm. respectively.

(iii) *Head circumferences* in boys and girls at 4th, 8th, 12th, 24th, 36th and 52nd weeks were—34.80-35.24; 36.83-36.41; 37.86-37.33; 42.09-39.84; 44.14-43.00; 45.20-44.60 cm. respectively.

(iv) *Chest circumferences* in boys and girls at 4th, 8th, 12th, 24th, 36th and 52nd weeks were—32.62-33.60; 36.58-35.56; 37.56-36.58; 42.42-39.40; 45.72-43.30; 46.80-45.20 cm. respectively.

The average birth weights of these male and female babies were 2.12 Kg. and 2.00 Kg. respectively and their birth lengths were 46.48 cm. and 46.28 cm. respectively.

The growth parameters of these male and female babies are given here in respect to their weight in Kg., length in cm., head circumference in cm. and chest circumference in cm. at different ages: At 4 weeks—2.93-2.75, 51.48-49.29, 34.93-34.83, 32.10-33.10; at 8 weeks—3.54-3.78, 52.95-55.32, 36.80-36.83, 36.01-36.73; at 12 weeks—4.77-4.01, 53.49-55.63, 37.57-37.01,

37.08-36.73; at 24 weeks—6.75-5.61, 64.00-58.72, 42.74-39.62, 41.49-38.55; at 36 weeks—7.10-7.00, 66.58-65.60, 43.45-42.60, 44.62-42.80; and at 52 weeks—7.80-7.50, 69.90-69.50, 44.80-44.80, 45.60-45.30 respectively.

Eleven out of 107 babies were born in between 32 to 38 weeks of gestation period. Their average birth-weight and birth-length were 1.97 Kg. and 45.72 cm. respectively. These babies were followed up for one year and their average weight in Kg., length in cm., head circumference in cm. and chest circumference in cm. are given here in the same order at different ages:

At 4 weeks 2.61, 47.43, 33.96, 29.35; at 8 weeks 3.59, 52.06, 36.55, 35.70; at 12 weeks 3.86, 53.13, 36.78, 36.46; at 24 weeks 5.81, 59.65, 40.00, 40.70; at 36 weeks 6.60, 63.50, 42.80, 43.60; and at 52 weeks 7.00, 67.40, 44.60, 45.00, respectively.

All these birth weights have been compared with the Lubchenco's intra-uterine growth chart, and it was seen that all the babies born at term fell below the 10th



percentile of intrauterine growth, whereas the babies born in between 32 to 36 weeks of gestation period were rather at the level of 10th percentile or above the interuterine growth level. But in subsequent development, the babies in the latter group, were unable to catch up with the former group.

**Developmental Assessment:** Developmental assessment was done roughly on basis of motor, languages, manipulation and speech.

**Illness:** In majority cases, general health and physical conditions were good inspite of their intrauterine growth retardation. In most cases, mothers needed instructions as regards the feeding and general management of the babies. But in some cases, either they came with specific complaints for their treatment or they came for the check up of their babies who were suffering from some minor ailments. The types of complications that were detected during their subsequent visits at

TABLE IV  
Developmental Assessment of the "Small-for-Date" Babies

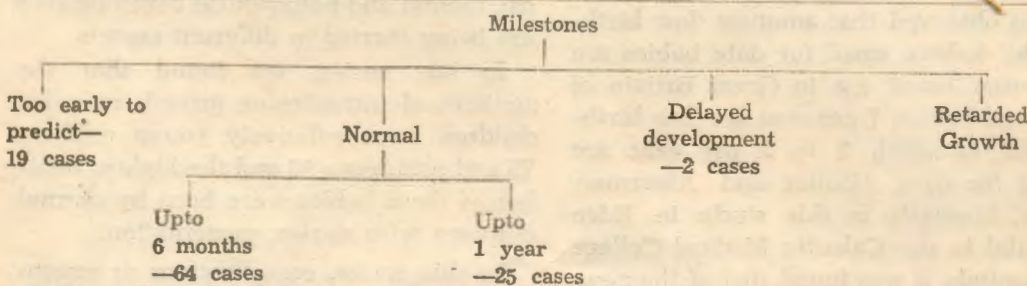


Table IV shows normal milestones and behaviour in 64 babies upto 6 months and in 25 babies upto 1 year. It was difficult to assess 19 cases who stopped coming to the clinic before 6 months. In 2 cases the developments were delayed as one of them was suffering from congenital cardiac lesion (V.S.D.) with which it was incapacitated and another was born at 32 weeks of gestation period. It was expected that it would take more time to catch up with the normals.

Six children were thought to be retarded in their behaviour in respect of their ages. Although a further reassessment and finer test would be needed to ascertain their degree of retardation in future.

No children with gross abnormalities and either physical or mental disability were detected.

#### Physical Examination and History of

the clinic are tabulated in Table V.

TABLE V  
Complications of the "Small-for-Date" Babies  
Detected in the "Follow-up" Clinic

Complications	No. of cases
Abdominal distension and flatulence	2
Vomiting (non-organic)	5
Diarrhoea	9
Constipation	4
Skin infection	3
Cough and Cold	18
Bronchitis	4
Whooping cough	1*
Measles	1
Thrush of the mouth	1
Laryngeal stridor	2
Watering and infection of eyes	1
Umbilical Hernia	2
Ventricular Septal Defect	1
Seborrhoeic Dermatitis and allergic rash	1

\* At 3 months



### Discussion

It is seen that a number of 'low birth-weight' babies have birth-weight significantly below that to be expected for the stage of gestation reached—they could have been born pre-term, at term or rarely after term or post-term. Various names have been applied to these infants, viz. light for date, small for date, intra-uterine growth retardation, pseudo-prematurity, placental insufficiency syndrome, dysmaturity etc.—of which the 'small for date' is more widely used (Forfar and Arnail, 1973).

It is observed that amongst 'low birth-weight' babies, small for date babies are not insignificant, e.g. in Great Britain of the total babies, 7 per cent are 'low birth-weight', of which 2 to 3 per cent are 'small for date' (Bulter and Alberman, 1969). Similarly in this study in Eden Hospital in the Calcutta Medical College & Hospitals, it was found that of the newborn babies 49.5 per cent were low birth-weight of which 42 per cent were constituted by 'small for date' babies.

Attempts may be made to assess the stage of maturation by measurements—e.g. length, weight, head circumference, chest circumference etc.

This may also be done from placental examination, though it would be relatively small, yet the weight/area-ratio on the placenta is sub-normal (Ounsted, 1971). But this is a retrospective study so placental data could not be available.

This study of 'small for date' babies became interesting in 1963 when Cruenwald demonstrated the difference in measurements of the 'low birth-weight' babies having same weight but different gestation age—viz., body-length and weight of brain, heart and lungs were nearest to normally grown babies in utero, while adrenals, liver, spleen and

thymus were subnormal in size (Gruenwald, 1963).

Later Shelley (1964) found unusual low carbohydrate levels and glycogen store in these groups (Shelley, 1964).

Similarly Hull (1966) demonstrated low fat content in them resulting poor thermo-regulatory response (Hull, 1966).

However, these small under nourished babies have appeared in the literature for more than 25 years viz. (McBurney, 1947). But the knowledge about it uptill now is inadequate, particularly about the aetiology, but the studies about its physical, mental and behavioural developments are being carried in different aspects.

In our series, we found that the mothers of intrauterine growth retarded children were relatively young mothers 75 and primipara 66 and the highest number of these babies were born by normal delivery with vertex presentation.

In this series, complications at pregnancy were lower—only 2 of antepartum haemorrhage, 1 case of pre-eclamptic toxæmia. Elderly primipara mothers were 10.

From the present study it was quite evident that intrauterine growth retarded babies born with less than 10 per cent of average weight and height, ultimately caught up with the 75 per cent of growth parameter.

These babies were born more amongst lower socio-economic group in our country. Again we found that the average parental height and weight of our series were less than that of other parts of northern India and Western countries (Dutta Banik *et al*, 1968; Love, 1965).

Majority did not have a big family, probably that was the reason why they were able to attend the clinic regularly for proper guidance regarding rearing-up of their children.



From this study we shall not be very wrong in assuming that 'small for date' babies born of these parents were due to hereditary shorter stature and potential under-nourishment.

### Conclusion

It is evident from the present study that for detection of aetiopathological aspects of the 'small for date' babies and for taking suitable measures to enhance their intrauterine growth there should be detailed data available regarding intrauterine growth including their circulatory state. The placental function together with its weight and histological appearances should also be considered.

Further follow-up of these cases till their adolescence will be able to give us their exact developmental assessment as regards both physical and mental fitness.

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