DEVELOPMENT OF MILK TEETH IN RURAL MEHERAN CHILDREN OF BANGLADESH

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PREFACE

The Cholera Research Laboratory (CRL) operates under a bilateral project agreement between the governments of Bangladesh and the United States of America. Research activities of CRL center on the interrelationships between diarrheal disease, nutrition, fertility and their environmental determinants. CRL issues two types of papers: scientific reports and working papers which demonstrate the type of research activity currently in progress at CRL. The views expressed in these papers are those of authors and do not necessarily represent views of Cholera Research Laboratory. They should not be quoted without the permission of the authors.

ABSTRACT

This study was conducted in the village of Meheran along with the prospective study of growth and development. This report is based on findings of about 350 children followed longitudinally. The children below the age of 1 year were monthly examined for eruption of teeth. Children over the age of 12 months were examined every 3 months. The dates of eruption of teeth between two examinations were elucidated from the mothers. The relation of dentition was compared with the income of the parents, birth weight and sickness. All the examinations were made by a single person who knew the community very intimately.

By the age of 30 months an average of 19 out of 20 milk teeth erupted in male and female children. The minimum and maximum time for eruption of 1 tooth was 5 and 18 months. The minimum time for developing all the milk teeth was 18 months for males and 15 months for females. 48 months were the longest time needed for the eruption of all milk teeth. This period is longer than the time taken by children of developed and some developing countries.

High birth weight favourably influences the eruption. But frequent sickness did not influence it. Poorer economic conditions of the parents delayed dentition up to 21 months of age and there after no influence was observed.

For calculation of age in month the formula '7 + average number of teeth ± 3 holds good up to 17 teeth only'. For children having more than 17 teeth a modified formula '11 ± 3 for 18-19 teeth only' can be used for children not exceeding 30 months of age. Baily's formula does not hold good for rural Bangladeshi children in estimation of age.

INTRODUCTION

Age specific dentition may reflect the nutritional status of children. In cases where proper age is not known, the counting of teeth may help in estimating the precise age of children. Many persons living in the developing regions of the tropics are ignorant of their exact age. Sometimes the mother may not know the child's age (1). The age of dentition for developed countries has been established. It has been found that the usual growth pattern of Bangladeshi children lags behind that in developed countries. Whether the age of dentition is also delayed in Bangladeshi children compared to the standard is not known. In rural areas when the exact age is not known the calculation of precise age from the weight and height is also difficult especially in Banglades where only one out of every 5 children is found to have normal weight for height for age (2). The opinion about the usefulness of tooth count for estimation of age varies from person to person. It has been shown that the time range of eruption is inadequately of lower socio-economic groups in Africa (3) in New Guinea (4) and Peru (5) is similar to that found among children in Europe and North America. McCance (6) reported that even in severely undernourished children dental eruption was not delayed. But McLaren et al. (7) have reported that deciduous teeth erupt later in marasmic infants. Delgado et al. (8) reporte that the weight at birth and the postnatal weight influence the eruption of deciduous teeth in Guatemala children. He also reported that the mean no. of teeth may be used as an estimate of mean age. Wellewicz et al. (9) reported that children heavier or taller at birth were ahead in dental development up to 20 months. He found no association of dental development with health grading, skin fold thickness or skeletal maturity. McGregor et al. (10) reported that up to 18 months the Gambian children lagged behind American and European children in number of erupted teeth. He found that children with delayed dentition are assessed as being younger than true chronological age. Baily (11) found no major differences in the eruption of deciduous tooth between different nutritional groups. He suggested the use of a table for estimation of age of children where true age is not known. Since physical growth and dentition at given ages are factors for comparing children's health with known standards of the world, it is necessary to establish the age of dentition in rural Bangladeshi children for consideration of the possible influencing factors.

Estimation of age is also necessary for clinicians. In field situations the weight for age and height are difficult to estimate. In such a situation we want to examine whether counting of tooth can help for easy ascertainment of precise age of children.

BACKGROUND

The Cholera Research Laboratory (CRL), Dacca has been operating a surveillance area in rural Matlab since 1962. At present there are 234 villages under surveillance. Meheran, a village of the area, was taken up for intensive surveillance of cholera in 1967-68. Since then this village had been the seat of many investigations conducted by many investigators. The population of the village as of the 1974 CRL census was 1934. The people mainly depend on agriculture and fishing. A longitudinally study on dentition growth and development of children has been carried out in the village since 1974. For this purpose a centrally located clinic had been established for recording of dentition and anthropometric measurements of the children. A trained paramedic supervised by a supervisor and aided weekly by a physician conducted the study. Two village aides helped him in bringing the children to clinic, sending them back home and also in taking measurement. In addition, socio-economic status and family history had been obtained. Field assistants visited biweekly for recording illness of children. The parents usually reported illness to the clinic for obtaining medicine. Serious cases of illness were referred to the Field Hospital at Matlab. The demography was kept upto date by regular home visits.

MATERIALS AND METHODS

The villagers were given the option of bringing their children to the clinic for anthropometric measurements. The age of all the children born after 1965 were known to the CRL office. All the new born were included in the study within 5 days of their birth. In addition, some children born earlier were also included. Free medicine were supplied for minor illnesses to all the participants.

Children were brought to the clinic monthly up to the age of 12 months and later every 3 months. The history of eruption of tooth between the visits was obtained from the parents as precisely as possible. The teeth were checked by fingertip palpation of gum by the paramedic during usual visits and also when they visited for sickness. The information was noted on a prescribed format for every child. If any child failed to attend the clinic on the prefixed dates the female aides brought him back to clinic by themselves. The children were grouped according to low and high birth weight, low and medium socio-economic status, low and high illness group, low and high nutritional status at different ages, etc. for the purpose of analysis. This data has been derived from 350 children.

RESULTS

Table 1 shows the eruption of average no. of teeth in Neheran children by age and sex. Out of the 80 boys aged 5 months only 3 had eruption of teeth. On an average at least 1 tooth grew in boys by the age of 9 months. This, however, does not mean that every boy reaching their 9th month had grown a tooth. By the age of 12 months the mean number of teeth was 5.5. At the age of 2 yrs. the average no. of teeth grown was 17.13 and by the age of 30 months the number was at least 19 out of 20 teeth. All the male children developed all the 20 milk teeth by 45 months.

The eruption pattern is not significantly different in female children than males. Amongst 80 female children only 2 grew a milk tooth by the age of 5 months. By the age of 9 months the mean no. of erupted milk teeth was 1.15. This was lower than male children (1.59). At the end of a year the average for females (4.84) was lower than males (5.45). At the age of 2 yrs. the average for females (17.16) is same as males (17.13). By the age of 30 months the mean for female children was 19.4 teeth which is not different from males. The female children spent 48 months for growing all the deciduous teeth. This period was 3 months longer than that of males.

The average weight in kg. and the mean no. of teeth is shown in Table 2. Only a few male children out of 80 grew

TABLE 1

ERUPTION OF MILK TEETH, AGE , SEX AND NUMBER OF TEETH

Ages Month	MALE			FEMALE		
	No. of Observation	No. of Teeth	Average Teeth	No. of Observation	No.of Teeth	Average Teeth
4	82	0	0	83	0	0
5	82	3	0.04	82	2	0.02
6	77	17	0.22	78	5	0.06
7	77	30	0.39	79	24	0.30
8	77	56	0.73	81	52	0.64
9	73	116	1.59	78	90	1.15
10	72	179	2.49	76	137	1.80
11	76	266	3.50	78	217	2.78
12	78	425	5.45	77	373	4.84
15	79	684	8.66	75	641	8.54
18	79	999	12.65	77	921	11.96
21	80	1228	15.35	80	1200	15.00
24	89	1525	17.13	73	1253	17.16
27	87	1612	18.53	70	1304	18.63
30	83	1606	19.34	70	1360	19.43
33	79	1557	19.71	67	1324	19.76
36	75	1491	19.88	65	1292	19.88
39	67	1337	19.96	59	1175	19.92
42	65	1299	19.98	55	1095	19.91
45	64	1282	20.03	52	1035	19.90
48	63	1260	20.00	48	964	20.08

TABLE 2
ERUPTION OF MILK TEETH BY AGE AND SEX

Age Month	Male			Female			Total			
	Observ. No.	Av. Teeth	Av.Wt.	Observ. No.	Av. Teeth	Av.Wt.	Observ. No.	Av. Teeth	Av.Wt.	Av. length
4	82	0	5.43	83	0	4.94	165	0	5.18	58.82
5	80	0.04	5.83	82	0.02	5.30	162	0.03	5.56	60,70
6	77	0.22	6.12	78	0.06	5.56	155	0.14	5.84	62.18
7	77	0.39	6.30	79	0.30	5.87	156	0.35	6.08	63.39
8	77	0.73	6.42	81	0.64	5.90	158	0.68	6.15	64.42
9	73	1.59	6.52	78	1.15	5.99	151	1.36	6.25	65.36
10	72	2.49	6.72	76	1.80	6.28	148	2.14	6.49	66.33
11	76	3.50	6.84	78	2.70	6.33	154	3.14	6.58	67.23
12	78	5.45	7.07	77	4.84	6.38	155	5.15	6.73	68.14
15	79	8.66	7.44	75	8.55	6.65	154	8.60	7.06	69.99
18	79	12.65	7.80	77	11.96	7.11	156	12.31	7.46	72.00
21	80	15.35	8.19	80	15.00	7.56	160	15.18	7.88	74.18
24	89	17.13	8.66	73	17.16	7.98	162	17.15	8.35	76.10
27	87	18.53	9.09	70	18.63	8.45	157	18.57	8.81	78.07
30	83	19.35	9.60	70	19.43	8.79	153	19.39	9.23	79.79
33	79	19.71	9.97	67	19.76	9.03	146	19.73	9.54	81.45
36	75	19.88	10.35	65	19.88	9.48	140	19.88	9.95	83.29
39	67	19.96	10.74	59	19.92	9.74	126	19.94	10.27	84.74
42	65	19.98	11.00	55	19.91	10.00	120	19.95	10.54	86.10
45	64	20.03	11.39	52	19.90	10.35	116	19.97	10.92	87.59
48	63	20.00	11.64	48	20.08	10.55	111	20.03	11.17	88.57

teeth when their average wt. was 5.83 kg. at the age of 5 months. On the average at least one tooth had grown in male children by the age of 9 months when the average weight was 6.52 kg. At the age of 1 yr., when the average wt. was 7.07 kg., the average no. of teeth grown was 5.45. At the age of 2 years the average no. of teeth was 17.13 when the wt. was 8.66 kg. When the average wt. increased to 9.60 kg. the age of 30 months while the average no. of teeth reached was 19.35. By the age of 45 months when an average of 20 teeth had grown, the average wt. attained by a male child was 11.3 kg.

In the cases of female children the average wt. (5.3 kg.) was less than male (5.83) when a few of them grew their 1st tooth at the age of 5 months. At the age of 9 months when at least one tooth grew the mean wt. was less in females (5.99 kg.) than males (6.52 kg.). Thus at the age of 12 months the females had an average of 4.84 teeth and an average wt. of 6.38 compared to a male child's averaging 5.45 teeth and 7.07 kg. in wt. At the age of 2 yrs., when both male and female children had an equal average no. of (17.13 and 17.16) teeth the average wt. was more than half a kg. less in females (7.98 kg.) than males (8.66 kg.). By the age of 30 months the mean no. of teeth was more in females, but the average wt. was nearly a kg. more in males. This difference remained constant until the development of an average of 20 teeth both in males and females at the age of 45 months and 48 months respectively. The average length of the sexes together was 65 cm. for developing an average of at least one tooth and 88 cm. for 20 teeth.

Figure 1 shows the average number of erupted milk teeth by age and sex. The average number of teeth erupted up to the 8th month of age was almost equal for both boys and girls. From the age of 8 months to 21 months boys developed more teeth than girls. Then the growth was almost identical for boys and girls. Over 50% of the milk teeth had erupted in children by the age of 16 months.

Table 3 shows the exact number of teeth erupted in boys by age and no. observed in each group. This shows that out of 80 children only one developed one tooth and another developed 2 teeth at the age of 5 months. At the age of 15 months only one child did not develop any teeth. The age of a child having only one tooth

FIGURE I

ERUPTION OF TEETH IN BOYS AND GIRLS BY AGE

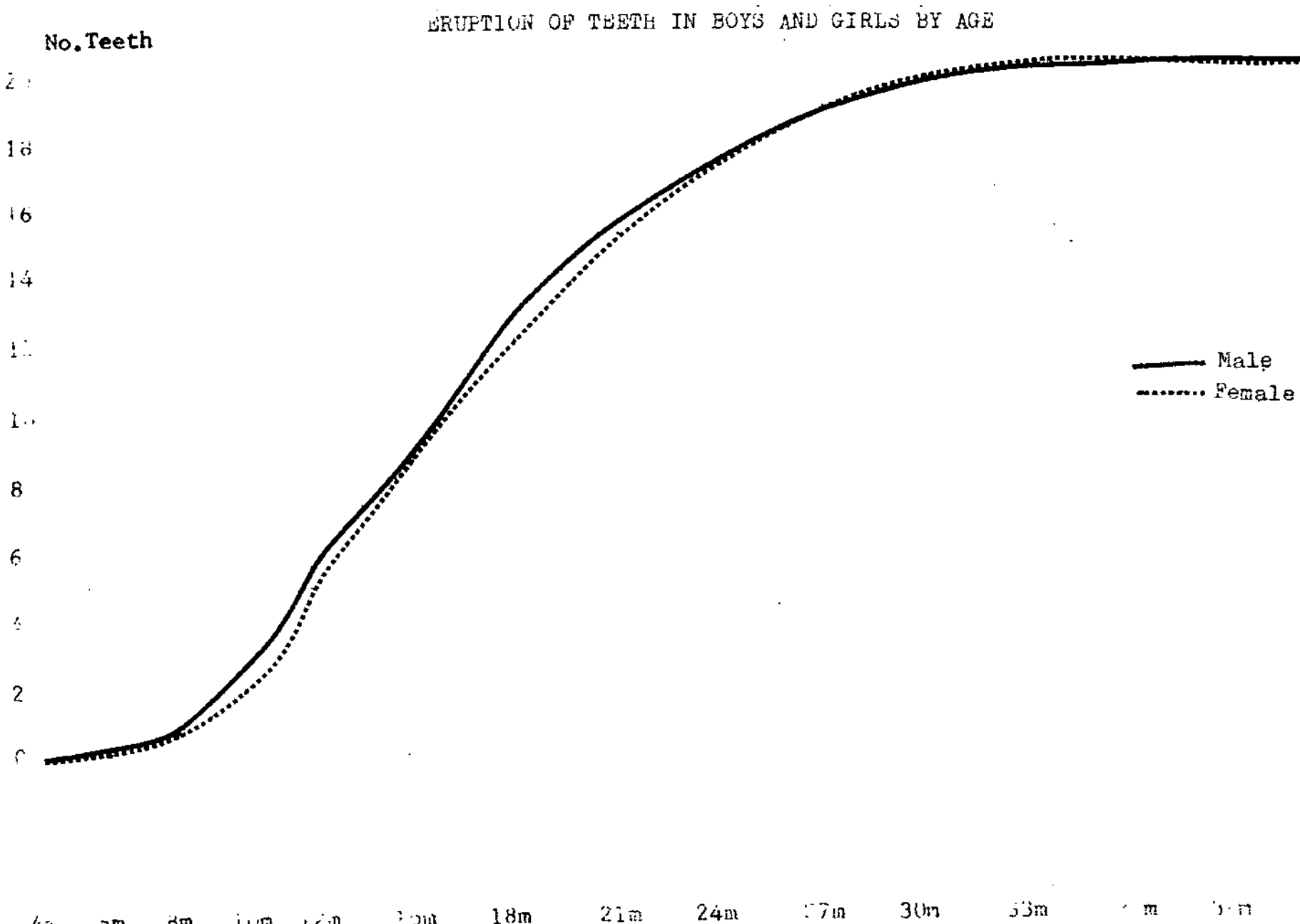

Table 3

Eruption of Milk Teeth in Male by Age

Age Month	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	No. Obs.
5	78	1	1																			80
6	68	4	3	1	1																	77
7	62	5	7	1	2																	77
8	54	7	8	2	4	1	1															77
9	39	5	12	3	8	2	2		1								1					73
10	25	4	15	2	13	6	3	1	2								1					72
11	17	3	12	8	11	4	12	2	5	1							1					76
12	5	2	10	4	12	5	17	2	10	3	4		1	1	1		1					78
15	1		1		7	5	9	7	10	4	11	6	9	5	1	1	2					79
18					1			1	8	2	9	5	14	11	3	6	15		1		3	79
21										1	1	4	10	2	8	7	27	7	4	1	8	80
24												1	3		6	6	27	8	10	4	24	89
27													1		1	2	16	5	8	9	45	87
30																	11		4	6	61	82
33																	2	4	1	5	66	78
36																	1	1	1	4	67	74
39																	1			3	62	66
42																	1			1	62	64
45																				2	61	63
48																	1				61	62

varied from 5 to 15 months. Similarly the age of a child having 8 incisor teeth may vary from 9-18 months. None developed 20 teeth before 18 months and by the age of 4 years nearly 99% developed all the deciduous teeth.

Table 4 shows the same distribution of tooth for girls as seen in Table 3 for boys. The age of a female child as is shown from this table for growing one tooth may vary the 5-18 months. For developing all the incisor (8) teeth in females the time taken may also vary from 10-24 months. None of the girls developed 20 deciduous teeth before 15 months and 98% of the female children developed all the (20) deciduous teeth by the age of 4 years.

Whether difference in average income has any association with the eruption of milk tooth has been shown on Table 5. It may be mentioned that there were none having a high income in the village and most of them were medium and low income group people. The family income has been arbitrarily divided into two classes, one earning up to Tk. 350 monthly and the second earning over Tk.350 per month. The lowest and highest range vary from Tk. 100 to Tk. 1000. It was noted that some of the children from the higher income group developed teeth at the age of 5 months but none from the lower income group did so at that age. At the age of 10 months there was one tooth more on the average in the higher income group than the lower. This trend continued up to the age of 21 months. The trend gradually equalised by 45 months of age.

Whether high or low birth weight has any association with the number of deciduous teeth which erupted has been shown in Table 6. The children have been arbitrarily grouped with the available data. The low birth weight group ranged from Kg. 1.30 to kg. 2.33. The range for the high birth weight group was kg. 2.66 to kg. 3.40. The average number of teeth in the high birth weight group appeared larger from the age of 6 months. From the age of 11 months this group led the lower birth weight group by one tooth on the average. At the age of 18 months the mean no. of teeth in the low birth weight group was 10.67 and 13.00 in the high birth wt. group. This difference continued and by the age of 33 months all the children of the high birth weight group had developed 20 teeth. This was only attained by low birth weight group in 36 months. It was apparent that higher birth weight was associated with early eruption of teeth. As the no.observed were fewer from the 30th month of age a larger no. is needed to be conclusive.

TABLE 4

ERUPTION OF MILK TEETH IN FEMALE BY AGE

Age Month	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	No. of Obs.
5	81		1																			82
6	75	1	2																			78
7	66	3	9	1																		79
8	57	8	11	1	2	1	1															81
9	47	5	11	3	9		3															78
10	38	2	14	2	10	2	6	1	1													76
11	23	7	13	6	9	2	11	2	5													78
12	7	2	10	5	12	7	18	3	5	1	4	1	2									77
15	1		1	4	5	2	9	9	5	8	10	1	14	3	1		1				1	75
18	1		1			1	3	6	2	3	5	6	17	10	4	4	7	2		1	4	77
21			1					1		1	4	6	8	2	7	7	20	7	3	2	14	80
24									1				7	3	5	3	7	5	13	4	25	73
27											1				4	3	6	2	6	5	43	70
30													1				3	3	4	3	56	70
33																		2	3	4	58	67
36																		2	1		62	65
39																		1	1		57	59
42																		1	1		53	55
45																		1	1		50	52
48																		1	1		47	48

TABLE - 5

NUMBER OF TEETH ERUPTED IN CHILDREN OF LOW AND HIGH INCOME FAMILIES

A g e	No. of Observation	High Income Average No.	No. of Observation	Low Income Average No.
5m	69	0.1	37	0.0
6m	68	0.1	39	0.1
7m	68	0.3	42	0.2
8m	69	0.6	46	0.4
9m	65	1.5	46	0.8
10m	64	2.5	46	1.5
11m	64	3.4	46	2.2
12m	64	5.7	51	4.6
15m	61	9.3	51	8.4
18m	59	12.7	54	12.3
21m	54	15.0	51	14.7
24m	46	17.0	51	17.0
27m	31	18.5	42	18.1
30m	15	18.9	28	19.1
33m	10	19.0	15	19.7
36m	6	19.2	12	20.1
39m	4	20.0	8	20.0
42m	5	20.0	9	20.0
45m	7	20.0	11	20.0
48m	9	19.6	12	20.3
51m	10	20.0	11	20.4
54m	9	19.6	12	20.0
57m	10	19.6	11	20.0
60m	10	19.6	13	20.6
63m	11	19.7	12	20.3
66m	11	20.4	11	21.1
69m	10	20.3	9	21.6
72m	9	20.5	9	21.7
75m	9	21.6	9	21.7

TABLE 6
AVERAGE NUMBER OF TEETH IN CHILDREN BORN WITH LOW AND HIGH BIRTH WEIGHT

Age Month	Low Birth Weight 1.30 Kg.-2.33 Kg		High Birth Weight 2.66 Kg.-3.40 Kg.	
	No. of Observation	Average Teeth	No. of Observation	Average Teeth
6	27	0.07	32	0.25
7	27	0.26	32	0.47
8	27	0.59	32	1.06
9	27	0.96	32	1.53
10	27	1.70	32	2.56
11	27	2.63	32	3.63
12	27	4.30	32	5.52
15	24	7.75	26	9.38
18	21	10.67	25	13.00
21	19	13.36	20	15.75
24	16	16.38	15	16.93
27	11	17.73	11	18.64
30	4	13.75	5	19.40
33	3	19.00	2	20.00
36	1	20.00	1	20.00

Figure II shows the differences in the eruption of teeth in low and high birth weight groups of children as has been described in Table 6.

The association of sickness and eruption of teeth is shown in Table 7. The no. of children without any sickness were very few in this low socio-economic group of children. Nevertheless, we have arbitrarily divided the children in 2 groups. Group I included children who had sickness up to 2 days per month. The children in group II had more than 2 days of illness. The mean for group I was 1.1 and for group II 3.4 days of illness per month. None of the children had any serious illness requiring prolonged hospitalisation. It appeared that the mean difference of 2.3 days of illness per month had no effect on the eruption of milk teeth.

DISCUSSION

The mean no. of deciduous teeth grown at the age of 9 months in London children is 2.3 and the mean for the age of 24 months is 16.3. The mean no. in our series at the age of 9 months for boys is 1.59 and for girls 1.15. These are less than the standard children of London and Paris. But by the age of 24 months the mean is 17.16 for girls and 17.13 for boys. This is higher than the former. For the growth of all 20 teeth the London children needed 36 months whereas the children of our series needed 45-48 months. Compared to the developed London and developing Gambian children the eruption time in our children is delayed especially the 1st appearance and final completion time. The reason why male children up to the age of 21 months grew a mean larger no. of teeth is not known. Whether it may be due to preferential feeding practice to male children needs further work. The minimum time needed for growth of a single tooth in our series is 5 months compared to 3 months needed by Gambian children. For the eruption of all milk teeth in all Bangladeshi children (rural) 48 months were needed compared to 36 months of London and Guatemalan children. This may be due to nutritional influence.

FIGURE II

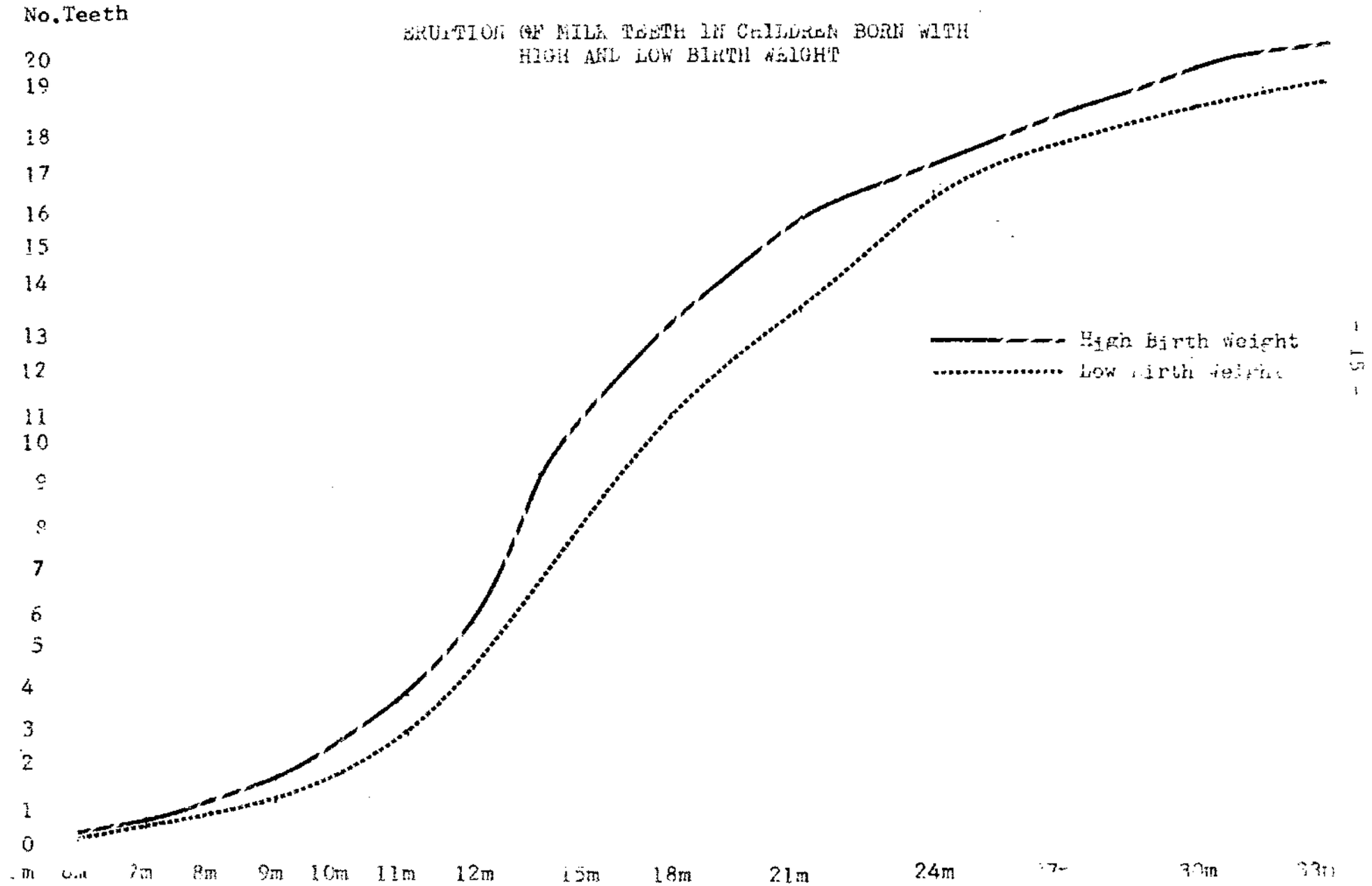
No.Teeth
ERUPTION OF MILK TEETH IN CHILDREN BORN WITH HIGH AND LOW BIRTH WEIGHT
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
7m
8m
9m
10m
11m
12m
15m
18m
21m
24m
30m
High Birth weight
Low Birth weight

TABLE 7

DENTITION IN SICK AND LESS SICK CHILDREN

Age: Month	Sick Child 3.4 days/p.m. No. of Observation	Sick Child 3.4 days/p.m. Average Teeth	Healthy Child 1.1 day/p.m. No. of Observation	Healthy Child 1.1 day/p.m. Average Teeth
4	29	0.00	38	0.00
5	29	0.07	38	0.03
6	26	0.15	33	0.15
7	24	0.42	32	0.38
8	24	0.71	30	0.77
9	22	1.27	24	1.13
10	22	2.14	19	2.05
11	22	3.09	17	3.06
12	21	4.86	17	4.88
15	17	7.12	13	7.46
18	11	11.55	10	10.10
21	8	14.25	7	13.00

Birth weight has been found to be associated with the early start of eruption of teeth as has been found by other investigators (8,9). The difference in the days of mild to moderate illness did not seem to have any influence on dentition. Further analysis considering greater differences in the days of illness may show its effect if any. Higher family income is associated with higher average no. of erupted teeth up to the age of 21 months. This again may be due to better nutrition in higher income group.

Baily (11) has suggested that simple addition of 6 to the number of teeth erupted gives the approximate age in months. In our series less than 35% of children grew 20 teeth by the age of 24 months. So, the above formula does not fit for calculation of age of this series of children of rural Bangladesh. To find out the approximate age of children in this group the formula '7 + no. of average teeth ± 3 shows the age in months for a very high percentage up to 17 teeth. Thereafter the formula 11 ± 3 with 18-19 teeth gives the age in month in most cases. Calculations using these formula appear to be useful up to 30 months of age only.

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