

MICROBIOLOGICAL ASPECTS AND CELL  
MEDIATED IMMUNITY CHANGES IN  
TEETHING INFANTS WITH DIARRHOEA

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**ABSTRACT**

Sixty infants were subjected to this work 25 of them having diarrhoea with teething another 25 infants affected with diarrhoea without teething. The remaining 10 infants were apparently healthy, served as controls. This study was done with the aim of search possible correlation between the members of the triangle: Teeth eruption; cell mediated immunity changes and diarrhoea. Clinical and Bacteriological examinations showed no significant differences in diarrhoea between these groups. On the other hand, it was found that teething is a natural physiologic process and the occurrence of diarrhoea could be due to coincidental systemic manifestations. The immunological status of these infants is variable according to the presence of systemic disturbances or not.

**INTRODUCTION**

There is a common belief among rural as well as urban mothers in Egypt, that diarrhoea associating teething is a benign event that needs no medical intervention.

Many authors consider eruption of teeth a normal process which is not accompanied by any systemic manifestations (1,2). Other investigators believed that teething is not a completely benign condition (3). It was postulated that there is a temporary decrease in defence mechanism (4). The greatest controversy is wheather or not teething causes diarrhoea. Many cases with diarrhoea were presented in a terminal state with dehydration and colapse and were not given any medications in the believe that infant was erupting a new teeth (5).

The present study is an attempt to find out the relationship between the members of the triangle: teeth eruption, cell-mediated immunity changes and diarrhoea.

**MATERIAL AND METHODS**

**Subjects:**

Sixty infants at the age of teething 6-24 from out-patient clinic of Zagazig University Hospital. They were subgrouped into the following:

**Group A:** Included 25 infants having one or more erupting teeth and suffering from diarrhoea for duration of few days. 12 of them were breast feeding.

**Group B:** Included 25 infants, having diarrhoea not associated with teething, 12 of them were breast-feeding.

**Group C:** Included 10 apparently healthy infants having one or more erupting teeth.

Cases were chosen so that data of eruption either preceded testing by days or both were coincident, cases with nutritional deficiencies, rickets or recent infection not associated with teething were excluded. All infants were subjected to full clinical examination including proper evaluation of the stage of teeth eruption according reported method (6).

Bacteriological examination of stools were done for 50 infants and cultured (as soon as possible) on the suitable media according to Collee et al (7). Serotyping of specific organism (E.P.E.coli, Salmonella and Shigella) were done using specific serologic tests. Stock agglutinating sera were obtained from Behring institute West Germany and Welcome Research Lab. (Hoechst).

Rosette test and Migration inhibition test were done to heparinized blood samples of the studied cases.

#### Rosette test:

Reading was done after one hour (Active rosette E1) and after 24 hours (E2) (8-10).

#### Migration Inhibition test(MIT):

Using phytohemagglutinin (PHA) as antigen Fycol trypaque lymphocyte separation medium (11).

The rosette measures the number of T-lymphocytes having the power to form rosette with sheep cells, while the MIT assesses their function. Atleast 200 cells were counted per sample in the former test, and 20% inhibition was considered significant in the latter test.

### RESULTS AND DISCUSSION

It was delineated that there is a three concepts of teething: a pathological process which has a cause and effect relationship between the eruption of teeth and the occurrence of clinical symptoms; a physiological process which regards these symptoms as a coincidental to teething and lastly primary physiologic process with mild discomfort (12).

On search for specific major bacteriological pathogen in stools of diarrhoeal cases with and without erupting groups, 90% of erupting and non-erupting cases gave a positive culture for pathogens. Enteropathogenic esherisia coli was 20% in teething group and 12% in cases without teething. Shigella, salmonella and compylobacter were isolated with incidence of 12%, 16% and 8%



respectively from teething group. While diarrhoeal cases without teething showed lowered incidence of the same organisms 9%, 8% and 4% respectively.

The most frequent E.P.E. coli serotype was O128 : B12 (8%), followed by O26 : B6 (6%). E.coli, shigella and salmonella were isolated from 23% of diarrhoeal cases with teething with respective incidence 7%, 5% and 11% respectively<sup>(5)</sup>. Other National (Egyptian) reports did not indicate whether diarrhoea was associated with teething or not and gave a variable figures for the causative organisms. These reported incidence E.P.E. coli varies from 7.8<sup>(12)</sup> to 82% (WHO, 1958)<sup>(13)</sup>. Shigella organism was reported to be 0.0% by Carpenter<sup>(14)</sup> and 35% by Neaderland<sup>(15)</sup> and that salmonella from 0.3% to 305%<sup>(3,16)</sup>. The most frequent salmonella serotype detected in the present study was S.enteritidis (6%) of all studied cases.

In Egypt (12) the incidence of shigella infection in diarrhoeal infant was reported to be 4.1%. Untypable E. coli was isolated in 2.8% of diarrhoeal cases associated with teething, while it was isolated in 40% of cases without teething. It was reported that<sup>(5)</sup> an incidence of 52% of untypable E. coli in diarrhoeal cases. This reported an incidence of 52% of untypable E. coli in diarrhoeal cases. This report however did not differentiate between diarrhoeal cases as regard the presence or absence of teething. Shig-dysentery was the most frequent isolated Shig-serotype (6%).

Proteus spp. accounted for 18% of diarrhoeal cases, a higher incidence (23%) was reported<sup>(5)</sup> and a lower one (9.6%) was also found by El-Diawani et al.,<sup>(12)</sup>.

Conclusively, bacteriological examination of diarrhoeal cases with or without teething revealed that teething has no effect on the frequency of infectious diarrhoea.

As regard to immunological aspect, there is a significant elevation of immunoglobulin in children with systemic manifestations and normal values in those free of symptoms. This was considered as a normal response to infections<sup>(17)</sup>. Also, significant elevation of the alkaline phosphatase enzyme was found in infants at the time of teeth eruption indicating that the process is a stressful one<sup>(2,18)</sup>.

As regard cell mediated immunity for infants undergoing primary teething, we found that the result obtained showed that active or one hour incubation rosette test (E1) and migration inhibition test of infants with diarrhoea were less than in infants without diarrhoea, but the difference was insignificant.

On the other hand, the rosette test was considered one of the best currently available method for counting human T.lymphocyte. However, it is not necessarily functional correlate of immunocompetence, since T-cell may be normal on counting but functionally abnormal and do not respond in vitro to mitogens or allergic cells<sup>(19)</sup>.

From this study we concluded that the process of primary teething is a natural physiologic process, and the systemic

manifestations such as fever, diarrhoea, .etc could be due to coincidental infections, and the immunological status of these infants is variable according to the presence of systemic disorders or not.

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### دراسة الميكروبية والتغير المناعى الخلوى لحالات الإسهال المصاحب للتسنين عند الأطفال

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اجرى هذا البحث على ٦٠ طفلا مصابين بالإسهال: منهم فى سن التسنين و ٢٥ طفلا ليس لديهم اسنان حديثة التكوين و ١٠ اطفال آخرون أصحاء تم اختيارهم كمجموعة الحكم وقد تم عزل الميكروبات المسببة للإسهال وتصنيفها، ووجد ان اكثر الميكروبات المعزولة المسببة للإسهال هو ميكروب عصبيات القولون (١٦٪) بينما ميكروب التسجيلا (١٢٪) والسالمونيلا (١٢٪).

وقد اظهرت نتائج الفحوص الإكلينيكية والبكتريولوجية ان وجود الإسهال ليس لها أى علاقة بالتسنين وان حدوث الإسهال مع التسنين انما هو ظاهرة فسيولوجية طبيعية والتغير المناعى الحادث فهو يكاد يكون متقاربا فى كلا المجموعتين "مجموعة الحالات ومجموعة الحكم".

Table (1): Frequency of bacterial pathogen of all studied cases.

Isolated pathogens	Cases with teething No. 25			Cases without teething No. 25			Total cases with diarrh-	Control No. 10
	Breast Fed.	Artificially Fed.	Total	Breast Fed.	Artificially Fed.	Total		
Entero-pathogenic E. coli	1	2	3	2	3	5	8	1
Shigella	2	1	3	1	2	3	6	0
Salmonella	1	1	2	1	3	4	6	0
Staph aureus	1	1	2	2	4	6	8	3
Campylobacter	0	1	1	1	0	1	2	0
Proteus spp.	3	3	6	2	1	3	9	1
Pseudomonas spp.	2	3	5	1	0	1	6	0
No growth	2	1	3	2	0	2	5	5
Total	12	13	25	12	13	25	50	10

Table (2): Shigella serotypes isolated from 50 diarrhoeal cases.

Shigella serotypes	Isolates associated with teething	Isolates not associated with teething	Total
Shigella boydii	1	1	2
Shigella flex.	1	0	1
Shigella dysentry	2	1	3
Total	4	2	6

Table (3): Salmonella serotypes isolated from 50 diarrhoeal cases.

Salmonella serotypes	Isolates associated with teething	Isolates not associated with teething	Total
S. typhimurium	1	1	2
S. enteritidis	2	1	3
S. paratyphi A	1	0	1
Total	4	2	6

Table (4): Enteropathogenic E.coli serotypes isolated from 8 diarrhoeal cases.

OB serotype	Isolates associated with teething	Isolates not associated with teething	Total
O26 : B6	1	0	1
O111 : B4	1	1	2
O119 : B14	1	2	3
O125 : B15	0	1	1
O128 : B12	0	1	1
Total	3	5	8

Table (5): The results of rosette test (E1 and E2) and MIT for 25 teething cases with diarrhoea.

Case	Age in (month)	E1 rosette (%)	E2 rosette (%)	M/T (%)
1	8	40	50	14
2	13	30	33	-
3	9	28	30	60
4	15	30	35	50
5	20	41	50	42
6	9	31	40	33
7	9	46	56	62
8	10	51	66	20
9	15	40	45	62
10	8	54	60	56
11	18	43	52	14
12	24	38	51	56
13	24	50	56	25
14	14	50	62	50
15	12	36	45	50
16	8	40	48	25
17	7	44	52	25
18	10	36	40	-
19	11	25	30	-
20	24	38	41	35
21	8	40	50	14
22	13	30	33	-
23	9	28	30	60
24	15	30	35	50
25	20	41	50	42
Mean $\bar{X}$	13.3	38.4	45.6	33.4



**Table (6):**The results of rosette test (E1 and E2) and MIT for 25 non-teething cases with diarrhoea.

Case	Age in (month)	E1 rosette (%)	E2 rosette (%)	M/T (%)
1	18	42	52	14
2	24	39	50	55
3	8	40	40	25
4	7	45	52	25
5	8	40	48	25
6	11	25	30	-
7	25	38	41	36
8	8	40	50	14
9	13	30	33	-
10	20	41	50	42
11	15	30	35	50
12	13	9	28	30
13	24	38	41	36
14	10	36	40	-
15	7	44	52	25
16	12	36	45	50
17	8	54	60	56
18	15	40	45	62
19	10	51	66	20
20	9	46	56	62
21	20	41	50	42
22	15	30	32	50
23	9	28	30	60
24	13	30	33	-
25	20	41	50	42

**Table (7):**The results of rosette test (E1 and E2) and MIT for 10 control healthy infants.

Case	Age in (month)	E1 rosette (%)	E2 rosette (%)	M/T (%)
1	8	54	60	-
2	12	48	56	50
3	15	56	62	80
4	18	55	67	83
5	15	46	59	56
6	8	40	52	50
7	24	40	50	33
8	7	32	54	75
9	24	38	54	60
10	12	56	68	28
Mean $\bar{X}$	14.3	46.5	58.2	51.5