

**RELATION
OF DIARRHOEAL EPISODES, TYPE OF DIARRHOEA TO
GROWTH**

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Skriftligt individuellt arbete under handledning enligt vetenskapliga principer,

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Abstract

Background: To find out the effects that associated with increasing diarrheal episodes and type of diarrhoea on the growth of children, at the same time correlate duration of diarrheal episodes, type of feeding and type of diarrhoea to growth.

Method: We studied prospectively 100 patients admitted to Al- Mansour Teaching hospital for children in the period from 1st of December 1998 to 1st of May 1999, complaining of different types of diarrhoea. We took these patients from different wards in the hospital; we took the history from the parents or the caretaker according to the questioner. We assessed their weight/height according to the type of feeding, type of diarrhoea, and number of attacks/last year.

Results: We found that a significant number of children with bottle-feeding that form approximately 66% and a significant number of children with that form approximately > 50% had low weight / height respectively. Also the bloody and persistent diarrhoea affect the children weight more than the acute watery diarrhoea.

Conclusion: We found that with increasing number of attacks of diarrhoea, we had more and more children with low weight/height. We found also that the bloody and persistent diarrhoea influence children's weight/height negative.

Introduction

Diarrhoea is the second leading cause of death in children under 5 years old and responsible for killing around 760000 children every year. Diarrhoea can last several days and can leave the body without the water and salt that are necessary for survival. Most children, who die from diarrhoea, actually die from severe dehydration and fluid loss. Children who are malnourished or have impaired immune system are most at risk of life threatening diarrhoea ⁽¹⁾

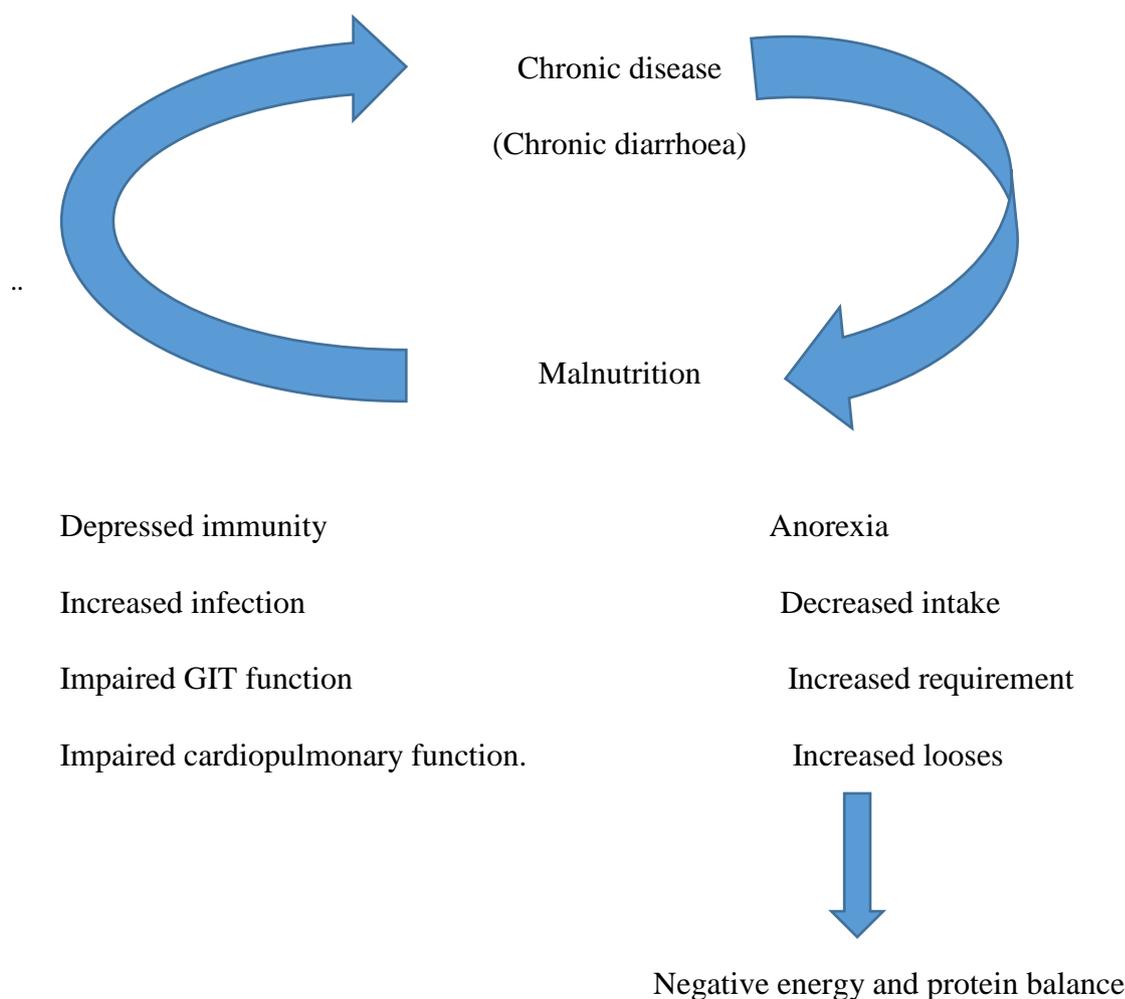
Malnutrition often associated with chronic diarrhoea as a result of the effect of malnutrition on gastro- intestinal tract (GIT; mucosal atrophy, secondary malabsorption), and increase susceptibility to viral, bacterial, protozoal and parasitic infections related to T or B cells immune deficiency state. Diarrhoea is an important cause of malnutrition. This is because nutrient requirement are increased during diarrhoea, as during other infectious disease, whereas nutrient intake and absorption are usually decreased. Each episode of diarrhoea can cause weight loss and growth faltering moreover, if diarrhoea occurs frequently, there may be too little time to catch up on growth between episodes. ⁽²⁾ Diarrhoea is defined as

the passage of three or more loose or watery stools in 24 hours period ⁽²⁾. Chronic diarrhoea is defined as an increase in the looseness, volume, or frequency of stools relative to the usual pattern for the individual and persisting for at least 2 weeks ⁽³⁾

Recurrent episodes of diarrhoea treated with prolonged periods of fasting or oral rehydration solution reduce caloric intake and contribute to malnutrition. ⁽²⁾

Diarrhoea may be worsening during rehabilitation in (10-20%) of children as a result of refeeding or formula intolerance (transient lactose or monosaccharide malabsorption or milk protein intolerance). ⁽⁴⁾

There is a vicious cycle between chronic disease and malnutrition as shown below and associated with an increased risk of infection, poor muscle function, delay mobility, retarded growth and prolonged admission to hospital. ⁽⁵⁾



So, infectious diseases and especially diarrhoeal diseases have been noted to have adverse effect on growth of underprivileged children. ⁽⁶⁾

Aim of the study

To find out the effects that associated with increasing diarrhoeal episodes on the growth of children, at the same time correlate type of feeding, type of diarrhoea, and number of diarrhoeal episodes with growth of children.

Method

This prospective study was carried out in Al- Mansour teaching hospital for children in Baghdad, Iraq, in the period from 1st Dec. 1998 to 1st of May 1999.

One hundred patients presented with diarrheal diseases, There were 71 males and 29 females, all collected from the different wards in the hospital. According to rules and routines in Iraq, each patients must pass through the acute emergency unit to have the first aid management to these children that need this, a part of investigations can obtained , and then children admitted to the various wards in the hospital. In each ward there was a specific room and sometimes there were two rooms with good isolation that arranged for admission of these cases with diarrhoea. The history was taken from the care taker according to the questioner sheet (Appendix).

The cases in our study were randomly selected, we collected one hundred cases within approximately six months duration, we took the cases that found in the wards who complained of diarrhoeal diseases within these six months and we found the age of the studied group ranged between, less than one month of age to twenty-four months of age. The period that decided for the study was relatively short and we believed that one hundred cases was relatively enough.

We concentrated on the effects that associated with diarrhoeal attacks, types of feeding, and types of diarrhoea and duration of diarrhoea to growth, we didn't use the mid arm circumference that used in the assessment of nutritional disorders. We found that children who presented with chronic or persistent diarrhoea formed 34 patients of one hundred, table no 4. Chronic diarrhoea is defined as an increase in the looseness, volume, or frequency of stools relative to the usual pattern for the individual and persisting for at least 2 weeks⁽²⁾

Each patient was examined fully and his weight and height were measured and plotted against standard chart for both boys and girls supplied by WHO. ⁽⁷⁾ Children that plotted on 50th centile for height and weight or little bit more on growth charts, considered as children with normal growth. Other children that their weight or height lied below the median

growth chart (50th centile) with one standard deviation or more considered as children with affected growth (low growth). We checked also the previous weights and heights of the babies if it was possible to see if the babies followed their normal percentile on the growth charts or not.

We divided the patients also according to type of feeding to exclusively breastfed; exclusively bottle fed and mixed feeding (breast, bottle, and food that prepared home). Parents or care taker told about the study and they gave their agreement at their children participate in this research.

Results

In the 100 cases we studied there were 71 males and 29 females. Male to female ratio 2.4:1. The age of studied group ranges between less than one month and twenty- four months which came by accident. The breast fed babies were 34%, 25% of them were males, 9% were females. Sixty percent of the studied group were bottle fed, 42% were males, and 18% were female. Six percent of the group were mixed feeding, four percent of them were males, and two percent were females according to table 1

Table 1. *Relation of the age and sex of the studied group with the type of feeding*

| Age/ months | Breast feeding | | Bottle feeding | | Mixed feeding | |
|----------------|-------------------|--------|-------------------|--------|------------------|--------|
| | Male | Female | Male | Female | Male | Female |
| 0-3 | 3 | 3 | 6 | 4 | - | - |
| 4-6 | 4 | 3 | 15 | 7 | - | - |
| 7-11 | 9 | 1 | 11 | 3 | 2 | - |
| 12-18 | 9 | 2 | 7 | 3 | 1 | 1 |
| 19-24 | - | - | 3 | 1 | 1 | 1 |
| Total | 25 | 9 | 42 | 18 | 4 | 2 |
| 100 | 34 | | 60 | | 6 | |

From the one hundred cases that we studied, we found that in the acute watery diarrhoea, the number of breast fed babies was more than bottle and mixed (16 versus 11, 4). While, in the bloody diarrhoea, we found that 28% of the cases were bottle, so number of

bottle feeding babies was more than breast. In chronic and persistent diarrhoea also number of bottle fed babies was more than breast and mixed according to the table no.2

Table 2. *Relation between type of diarrhoea and type of feeding*

| Type of diarrhoea | Breast feeding | Bottle feeding | Mixed feeding |
|---|----------------|----------------|---------------|
| Acute watery N=31 | 16 | 11 | 4 |
| Bloody diarrhoea N=35 | 6 | 28 | 1 |
| Chronic or persistent diarrhoea N=34 | 12 | 21 | 1 |
| Total N=100 | 34 | 60 | 6 |

Bottle fed babies presented mostly with bloody and persistent diarrhoea.

Table 3 arrange to check the relation between the type of feeding and the weight of the studied group.

Table 3. *Relation between the type of feeding and the weight/height of the studied group*

| Type of feeding | Normal weight/height | Low weight/height |
|---------------------|----------------------|-------------------|
| Breast fed N= 34 | 15 | 19 |
| Bottle fed N= 60 | 18 | 42 |
| Mixed fed N= 6 | 2 | 4 |
| Total N= 100 | 35 | 65 |

We had more than half of the breast fed babies had low weight for height and 42 cases out of 60 of the bottle fed babies had a low weight for height. We found that two cases of mixed feeding had a normal weight for height while four cases had a low weight for height.

So the number of normal weight for height in all types of feeding was 35 while low weight for height in our studied group was 65.

Regarding the relation between type of diarrhoea and weight for height of children concerned and according to Table 4, we found that the number of low weight/height babies were more than twice in the persistent and bloody diarrhoea and it was almost equal in the breast fed babies as shown in the table no.4 under.

Table 4. *Relation between type of diarrhoea and weight of children*

| Type of diarrhoea | Normal weight/height | Low weight/height |
|--|----------------------|-------------------|
| Acute watery diarrhoea N=31 | 16 | 15 |
| Bloody diarrhoea N=35 | 9 | 26 |
| Chronic or persistent diarrhoea N=34 | 10 | 24 |

To check the type of feeding versus the number of attacks of diarrhoea, we found that the bottle and mixed fed babies had a greater chance to develop more than on attack of diarrhoea and in children with more than four attacks/12 months; all of them were bottle feeding as shown in table 5.

Table 5. *Relation between number of attacks of diarrhoea /last 12 months and type of feeding*

| No. of attacks /12 months | Breast | Bottle | Mixed |
|---------------------------|--------|--------|-------|
| One attack N=32 | 15 | 17 | - |
| Two attack N=32 | 8 | 21 | 3 |
| Three attack N=29 | 10 | 17 | 2 |
| Four attacks N=3 | 1 | 1 | 1 |
| >4 attacks N=4 | - | 4 | - |
| Total N= 100 | 34 | 60 | 6 |

According to table no.6, shows that the more the number of attacks of diarrhoea, the lower the weight/ height of children concerned.

Table 6. *Relation between number of attacks of diarrhoea/12 –months to weight/ height of children*

| NO. of attacks/12 months | Normal Weight/height | Low weight/height |
|--------------------------|----------------------|-------------------|
| One attack N= 32 | 18 | 14 |
| Two attack N= 32 | 11 | 21 |
| Three attack N= 29 | 6 | 23 |
| Four attacks N=3 | - | 3 |
| >4 attacks N= 4 | - | 4 |
| Totalt N= 100 | 35 | 65 |

Discussion

Attack of diarrhoea has an impact on the general health of children, and especially on their weight. ⁽¹⁾ We found that number of babies with bottle feeding were greater than number of babies with breast feeding (Table 1). Incidence of breast feeding is declining in most developing countries, probably because the beliefs that bottle feeding is modern, the aggressive promotion of infant formula, the need of the mothers to work away from their children, the lack of nurseries at places of work, and lack of medical and nursing support for mothers who wants to breast fed. ⁽²⁾ The decline of breast feeding in industrialised societies began 50 years ago, then spread to the developing countries. ⁽⁸⁾

From our study we had greater number of babies with bottle feeding presented with bloody diarrhoea, chronic or persistent diarrhoea, table 2. This result occurs due to the fact that failing of breast fed exclusively for the first 4-6 months of life; the risk of developing

severe diarrhoea is many times greater in infants who are not breast fed than those who are exclusively breast fed.

Using the infant feeding bottles, these easily become contaminated with faecal bacteria and are difficult to clean, when milk added to an unclean bottle it becomes contaminated, if it is not consumed immediately, bacterial growth occur.

Storing of food at room temperature, if food is kept for several hours at room temperature, bacteria in it can multiply many times. Using of contaminated water with faecal bacteria for drinking. ⁽²⁾

Number of cases with bloody diarrhoea is higher with bottle feeding compared with breast feeding because breast milk contains antibodies to protect against certain types of diarrhoeal diseases such as shigellosis and cholera. ⁽²⁾

For persistent diarrhoea although it is defined as diarrhoea which last more than 14 days, but also may develop when children experienced a recent episodes of acute diarrhoea on a previous episode of persistent diarrhoea. ⁽²⁾

The introduction of animal milk or formula could reflect lactose intolerance, hypersensitivity to milk protein, and bacterial contamination of milk. ⁽²⁾ One third of our cases in this project was exclusively breast fed, and irrespective of age.

Almost more than half of them had low weight /height, table 3. This is true especially when there are no other foods added to full fill the normal nutrient requirement necessary for growth of those babies less than 2 years of age.

The increasing number of cases of low weight/ height in the bottle and mixed fed babies is logical because of the chance to get more contaminated milk and food leading usually to recurrent attack of diarrhoea.

So, introduction of animal milk or formula may be associated with many problems as allergy to milk protein, lactose intolerance, and contamination. Wrong feeding technique as diluted formula will lead to a reduced nutritional values. ⁽²⁾ Comparing different types of feeding in relation to weight of children, we found that breast feeding is the best for children as breast milk is well tolerated, and children who continue to breast fed during diarrhoea actually have reduced stool output and shorter duration of illness than children who

are not breast fed. ⁽²⁾ Regarding the type of diarrhoea to the weight of children (Table 4), we found that the low weight of children were more in cases of bloody and persistent diarrhoea.

As bloody diarrhoea cause intestinal mucosal damage by invasion of bacteria, and anorexia, so rapid weight loss occur. Weight loss in persistent diarrhoea is usually because of anorexia, malabsorption, and with holding of food. ⁽²⁾

Comparing the type of feeding with the number of attacks of diarrhoea we had the parallel result of bottle and mixed feeding with increasing number which is true when we think of the bottle as a source of infection and the contaminated food added to the diet. ⁽²⁾

With the increase in number of diarrhoeal episodes, we found the more the numbers, the lower the weight/ height of the children (Table 5).

As diarrhoea is an important cause of malnutrition, because nutritional requirement are increased during the episodes of diarrhoea, nutrient intake and absorption are usually decreased. So each episode of diarrhoea can lead to weight loss and affection of growth. ⁽²⁾ Children who experience or have persistent diarrhoea, are more likely to become malnourished than children who experience fewer or shorter episodes of diarrheal attacker.

In general the impact of diarrhoea on nutritional status is proportional to the number of days a child spends with diarrhoea each year. ⁽²⁾ It was estimated that the presence of diarrhoea reduced increases in weight and length. ⁽⁹⁾

This study is valuable and oriented because the results of my study can explained according to the literature. Results show facts that are similar with literature e.g. ⁽³⁾.

This study can also be valuable in Sweden because there are a lot of children which complain of diarrheal diseases that seek help in primary health care centre. ⁽⁹⁾ A lot of families which have children come from different countries with different cultures, educational levels and believe e.g. Iraq, Syria, Sudan, Eritrea and Somalia. A large number of mothers who come from these countries prefer bottle feeding than breast feeding, though we can participate in the prevention program of diarrheal diseases and prevent the adverse effects of diarrhoea on children health.

If the number of patients that participated in this study were more than one hundred and if the time which needed to perform the study was little bit longer, could the study be more informative, we could take more than one hundred patients instead of one

hundred patients, we could search and seek for more details e.g. nutritional state, associated diseases and socioeconomic state. More information and more analysis could be obtained.

As a conclusion, that we obtained from my study

- 1- A great proportion of children who admitted to the hospital with diarrhoeal diseases were bottle fed.
- 2- Bloody and persistent diarrhoea could be causes of growth faltering.
- 3- Severity of growth faltering is proportionate to number of diarrhoeal episodes.

As a recommendation to prevent growth faltering, good nutrition must be maintained both during and after an episode of diarrhoea, this can be achieved by continuing to give generous amount of nutritious foods throughout the episodes and during the convalescence.⁽¹⁰⁾

Sammanfattning på svenska

Bakgrund: Att se effekterna av ökande diarréepisoder på tillväxten av barn samt för att korrelera längden av diarréepisoder, typ av matning samt typ av diarré med tillväxt.

Metod: Vi studerade prospektivt 100 patienter inlagda på Al- Mansour undervisning sjukhus för barn under perioden 1 december 1998 till 1 Maj 1999, klagar över diarré. Patienterna som deltog i studien samlades från avdelningarna på sjukhuset. Anamnesen tog från vårdnadshavarna enligt en special formulär. Föräldrarna och vårdnadshavarna informerades om studien. Föräldrarna och vårdnadshavarna lämnade samtycke om att deras barn skulle delta i den här studien.

Barn som deltog i studien delade enligt typ av matning till helammade barn, barn som matades med flaska och barn som hade blandad matning. Dessa barn undersökte noggrant och fullständigt. Vi bedömde deras vikt/längd i enlighet med typen av matning, typ av diarré, och antalet attacker/ senaste år. Frågor om duration på varje attack av diarré, associerade symptom och vilken typ av behandling som dessa barn fick, frågorna fanns redan på formulären och fylldes i. Vi koncentrerade oss på undersökning av barn med tecken på dehydrering och med tecken på malnutrition.

Resultat: Vi fann att ett stort antal barn med flaska och blandad matning hade låg vikt/längd (66 %, > 50 % av fallen) respektive. Vi hittade även att blodiga och ihållande diarré påverkar barnen så att de väger mer än barn med akut vattning diarré.

Slutsats: Fler barn som blev inlagda var flaskmatade än ammade. Med ökande antal attacker av diarré, hade vi allt fler barn med låg vikt/längd. Den blodiga och ihållande diarrén kan påverka barns vikt/längd negativt.

Appendix Relation of number of diarrhoeal episodes to growth

A prospective study from 1st of December 1998 to 1st of May 1999

Patient name:

Age:

Sex:

Residence:

Date of admission:

Number of siblings:

Position of the baby in the family:

Birth weight:

Weight: length: H.C:

Type of feeding: Breast Bottle Mixed

Number of episodes of diarrhoeal attack /year (12 months):

For each attack

Duration and management: (a) Drugs (b) fluids (c) Nutrients

Number of admissions to hospital with attacks other than this:

Associated symptoms:

Abdominal pain Vomiting Rectal prolapse

If these episodes of diarrhoea are:

Bloody with fever:

Bloody without fever:

With pus:

With mucus:

Family history of other siblings:

If they have episodes of diarrhoeal disease:

Death:

Effect of change of feeding during and after the attacks:

On examination:

Signs of dehydration: Wasting:

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