Relation between Behavioral Factors, Malnutrition and Persistent Diarrhea in Children Under Two Years of Age. A Hospital Study

Adel A. Al-Badri, CABP Pediatrics *
Makaei A.F. Al Ammary, CABP Pediatrics *
Ghazwan G.Al-Badawi, FICMS Pediatrics *
Shehab A.Al Azawi, FICMS Nephrologist **

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Summary

Background *A high prevalence of Behaviors which is related to persistent diarrhea and the prevalence of moderate to sever malnutrition in patients with persistent diarrhea in children.*
Objectives *To asses the prevalence of negative behaviors that causes the persistent diarrhea and to asses the prevalence of malnutrition among children with persistent diarrhea and to compare prevalence of malnutrition due to persistent diarrhea to that of national figures.*
Patients and Methods *This study was carried out at the Central Teaching Hospital for Children in Baghdad, a total number of 200 cases of persistent diarrhea (lasting more than 14 days)"with no more than 48 hour normal bowel motions in this period" in children less than 2 years of age. The period of the study was one year from the 1st of January 1999 to the thirty-one of December 1999. Information was taken from patient's companions usually the mothers and the patients were selected at Inpatient, out patient and Emergency departments in a randomized way.*
Results. *The study showed that the most common age group of persistent diarrhea was the 2nd half of the first year constituting (47%) (94/200) of patients with persistent diarrhea. Patients whose mothers were illiterate constituted a high proportion (48%) (96/200). Patients on bottle or mixed feeding constituted (77%) (144/200). A high prevalence of some behaviors which is related to persistent diarrhea was noticed like allowing the children to pick up food spilled on the floor and eat it (65%) (130/200), stopping or altering feeding during episodes of diarrhea (78%) (156/200), mothers neglecting washing hands or their babies hands before feeding their children (74%) (148/200) and (66%) (132/200) respectively, failure to introduce solid food in 1st year of life (72.3%) (94/ 130) and failure to eat adult type of food in 2nd year of life (65.7%) (46/ 70). The prevalence of moderate to sever malnutrition at the three age groups was significantly higher in children with persistent diarrhea in present study compared to general population figures reported by polio immunization national day (PIND) survey at 1999 in Iraq, marasmus was significantly more common in 2nd half of the 1st year of life and the prevalence of kwashiorkor was significantly higher (15.8%) (11/70) among the older age group (2nd year of life)*
Conclusion*. The most common age group who developed persistent diarrhea was the second half of the first year of life. The negative behaviors of the mothers had a significant effect on the occurrence of persistent diarrhea in children and the development of malnutrition diseases like marsmus and kwashiorkor*
Key words. *Persistent diarrhea, malnutrition, marsmus, kwashiorkor*

Introduction :

Diarrhea has many definitions but in epidemiological studies it is defined as a passage of three or more loose (take the shape of the container) of watery stool in 24 hours period. Diarrhea may be acute watery (which is usually less than 14 days) most of them usually last up to 7 days without visible blood. It is the most common cause of dehydration. It may be due to Rota virus, entrotoxisenic E-coli, shigellosis, campylobacter and cryptosporidium [1]

If diarrhea associated with blood (dysentery) it is usually associated with anorexia and rapid weight loss and if the bacteria are invasive it may lead to perforation. Dysentery could be caused by shigella, campylobacter jejune, infrequently Enteroinvasive E-coli, Salmonella and E-histolytica which cause serious dysentery in adult but rarely in children [2]
The risk of persistent diarrhea was higher for infants with dysentery, fever at the onset of diarrhea, fasting and taking antibiotics prior to hospital admission[3]
A persistent diarrhea begin acutely but has along duration at least 14 days it may begin as watery or as dysentery, it may lead to weight loss and if looses of stool is big enough it may cause dehydration .

* *Consultant Pediatrician, Central Teaching Hospital for Children, Baghdad, Iraq*
** *Consultant Pediatric Nephrologist, Central Teaching Hospital for Children, Baghdad, Iraq*

No single cause of persistent diarrhea is claimed, Enteroaggregative E –coli, shigella and cryptosporidium are among possible causes [4, 5].

Persistent diarrhea should not be confused with chronic diarrhea which is recurrent, due to non infectious causes like celiac disease [6] and metabolic diseases. Persistent diarrhea usually by feco-oral route by ingestion of fecal-contaminated water or food or direct contact with infected feces.

Factors that increase the risk of diarrhea include failing of breast feeding exclusively for the 1st 4 months of life, offering bottle feeding with breast feeding or bottle feeding alone ,with poor sterilization of the bottle and the milk, poorly stored milk and food at hot days, the use of contaminated water for preparation of milk and food. The hands of the mother and the child should be washed before making and offering the food for the child. The mother should be advised to breast feed her baby for 2 years to reduce the risk of diarrhea [7]

Malnutrition especially sever one increase the duration of diarrhea and leads to persistent diarrhea [8] .Under weight children (<80%) of their expected weight and marsmus (< 60%) of expected weight, Kwashiorkor (60%-80%) of the expected weight with edema all found to be associated with persistent diarrhea [8]

Infectious diseases like measles, chicken pox are associated with persistent diarrhea.

Regarding the age, the most common episodes occurred in the 1st 2 years of life is highest in the 6-11 months age group, diarrhea is common in warm season, viral diarrhea (Rota viruses) during winter, while in tropical areas Rota virus diarrhea ocurre through the year. Bacterial diarrhea usually occurred during winter, raining season [1]

Persistent diarrhea may follow an epidemic out break of vibriosis or shigellosis dysentery [9]. Persistent diarrhea seriously affects nutritional status, growth, and intellectual function. Meeting these challenges is profoundly important, particularly in developing countries. [10]

Patients and Methods

This study was carried out in Central Teaching Hospital for Children in Baghdad for a period of one year from the first of January 1999 to the thirty-one of December 1999.

Persistent diarrhea was defined as loose or watery stool lasting for more than 14 days with no more than 48 hours normal bowel motion.

A patient with normal bowel motion during these 14 days and interval lasting more than 48 hours was considered as new episodes and excluded from the study.

Patients were selected randomly from outpatient, inpatient and emergency wards.

The reason for asking the medical advice are either for investigation of prolonged diarrhea of unknown etiology or complications of sever diarrhea like dehydration or sign of sever infection, repeated vomiting and malnutrition are among the other causes. If diarrhea proved to be as a result to infection outside gastrointestinal tract (paranteral diarrhea), the patient was excluded from the study.

For data collection a special questionnaire form was used to collect information through a personal interview with the patient's companions, usually the mothers of the patients.

The information included:

1. Name sex, address and record number
2. Weight for age percentile chart to asses and diagnosis of malnutrition
3. Level of maternal education
   A. Illiterate: unable to read and write
   B. Just illiterate: those who complete the primary school
   C. Higher education: intermediate school and higher
4. Type of feeding; breast, bottle or mixed
5. Did the child picked up food from the floor and eat it?
6. Did the mothers use soap and water to wash their hands or their child's hands
   before they feed their children?
7. Asses the type of malnutrition, wheather the child is marsmic or kwashiorkor For statistical analysis, Chi-square was used, and it was considered significant if P value was ≤ 0.05

Results

As shown in table 1, two hundreds eligible cases were included in the study, patient's mothers were either illiterate (48%) or just illiterate (34%) and (77%) of patients were on bottle or mixed feeding. Patients coming from rural areas constitututed (64%) of the study sample and about (65%) of patients were infants less than one year old, and the remaining (35%) were children in the second year of life. Male constituted more than half of the cases (60%).

The prevalence of negative behaviors were shown in table 2 which showed that altering or stopping feeding during diarrheal illness was the most frequent negative behavior in the study sample (78%), the next was neglecting to wash the mother's hands with soap and water before feeding (74%), failure to introduce solid food in the first year of life was reported in (72.3%) of the cases and failure to eat adult type of food in 2nd year of life was reported in (65.7%) of cases.

As shown in Fig.1, (51%) of the patients in the study showed signs of malnutrition and has the lowest prevalence in the second year of life (44.3%) compared to the prevalence of (52.8%) and (55.3%) in the 1st and second half of the first year of life respectively, the association between the age and the prevalence of malnutrition failed to reach the level of statistically significance.

Table 3 showed that the prevalence of underweight was highest in the first half of the 1st year of life (27.8%) compared to (16%) and (11.4%) in the remaining age groups, the difference failed to reach the level of statistically significance

The prevalence of Kwashiorkor was significantly higher (15.8 %) among the older age group (2nd year of life) compared to (2.8%) and (2.1%) in the first and second half of 1st year of life respectively

The prevalence of marsmus was highest in the 2nd half of the 1st year of life(37.2%) ,A lower prevalence was observed in the 1st half of the first year of life (22.2%) and the lowest prevalence was seen in the second year of life (10%) ,the association between age and prevalence of marsmus was statistically significant.

The prevalence of marasmic –kwashiorkor was higher in the second year of life (7.1%) compared to none in the first year of life, however the observed difference was not statistically significant

The prevalence of moderate to sever malnutrition at all age groups (which was included in the study was higher in children with persistent diarrhea in the present study compared to general population of children under 2 years of age reported by PNID , poliomyelitis immunization national days survey in 1999

Discussion:

The results showed that the most common age group who developed persistent diarrhea was the second half of the first year of life constituting about half (47%) of the patients, this findings was consistent with that of the WHO[(1)] where it has been explained that the immunity delivered from the mother decreases in the second half of the first year of life together with the introduction of food which may be contaminated ,malnutrition may complicate the picture also, and this is consistent with another study which showed that peak rates of overall, acute, and persistent diarrhea occurred in the 6-11-mo and 12-17-mo age groups[(11)].

There was slight preponderance of males (60%) which does not seem to have any clinical implications since it was not significantly different from (51%) proportion expected for male so it is more or less a chance finding. Male gender was not mentioned as a risk factor for diarrhea [(1)]

Patients whose mothers were illiterate constituted an obviously high proportion (48%) it is known that diarrhea has higher incidence in patients whose mothers had a low or no education at all [(2)] the finding is easy explained by the effect of poverty, improper sanitation which favor feco-oral transmission and delay in obtaining medical advice since they were underprivileged population sector.

In the present study about (77%) of patients were on bottle or mixed feeding. It is well known that breast feeding is protective against all types of infections. Previous studies has demonstrated that continues breast feeding for more than 6 months markedly decrease the incidence of persistent diarrhea [(1,2,3,4)] the explanation for this finding was easy since breast milk is ready, sterilized in all times free of bacteria and also reduce the chance of gastroenteritis due to unsanitary condition. Breast feeding also transfer macrophages and immunoglobulin especially in colostrums.

About two thirds of mothers in the study allowed their children to pick up food spilled on the floor and eat it, this food is contaminated with different kinds of pathogens which increase the risk of having diarrhea this fact was mentioned in case control study from Burma 1994[(3)]. About three quarters of mothers (75%) in the present study stopped or altered feeding during episodes of diarrhea which increased the chance of malnutrition which was in turn increased the cases of persistent diarrhea

A high proportion of mothers neglecting washing their hands or babies hands before feeding their children, this type of unhygienic life clearly increase the risk of persistent diarrhea because of increase contamination, this finding is consistent with a study by Bhatnagar et al [(7)] when an increase incidence of persistent diarrhea was linked to unhygienic behavior of neglecting washing the mother's or child's hands before feeding

Failure to introduce solid food in the first year of life and failure to eat adult type of in the second year of life was highly prevalent in the present study which were regarded as a contributing factors to the high prevalence of malnutrition observed in this study

The prevalence of moderate to sever malnutrition in this study (51%) in the three age groups was obviously and significantly higher in children with persistent diarrhea in the present study compared to the general population as reported by PNID [(12)]

Another studies reported that malnutrition increased the risk of persistent diarrhea [(4, 5, and 13)]

The association between malnutrition and persistent diarrhea is like a viscous circle where persistent diarrhea leads to malnutrition because of increase loss and/ or decrease intake and malnutrion leads to persistent diarrhea because of decrease immunity and decrease intestinal motility allowing bacterial overgrowth[(2)] there was no important difference in the prevalence of malnutrion in the three age groups studied however marsmus was significantly more common in the 2nd half of the 1st year of life and the prevalence of kwashiorkor was significantly higher (15.8%) among the older age group(the 2nd year of life) this finding was reported by Barnes and Curren [(14)]

Table 1: Distribution of the study sample by certain variables.

	N	%
1. Educational level of mothers		
Illiterate	**96**	**48**
Just illiterate	**68**	**34**
Higher education	**36**	**18**
2. Type of feeding		
Breast	**46**	**23**
Bottle	**84**	**42**
Mixed	**70**	**35**
3. Residence		
Urban	**72**	**36**
Rural	**128**	**64**
4. Age		
1st half-first year of life	**36**	**18**
2ndhalf-first year of life	**94**	**47**
2nd year of life	**70**	**35**
5. Gender		
Male	**120**	**60**
Female	**80**	**40**
Total	**200**	**100**

Table 2: prevalence of different types of negative mother's behavior.

	N	%
1.Child pick up spilled food on floor and ear it (n=200)	**130**	**65**
2. Feeding altered or stopped during episodes (n=200)	**156**	**78**
3.Neglecting washing the child's hands with soap and water Before feeding (n=200)	**132**	**66**
4. Neglecting washing the mother's hands with soap and water Before feeding (n=200)	**148**	**74**
5.Failure to introduce solid food in the first year of life (n=130)	**94**	**72.3**
6.failure to eat adult type of food in the 2nd year of life (n=70)	**46**	**65.7**

Table 3: Prevalence of different types of malnutrition in the study sample by age.

	No sign of Malnourishment		Underweight		Kwashiorkor		Marsmus		Marsmic-Kwashiorkor		Total	
Age	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
1st half-first year of life	**17**	**47.2**	**10**	**27.8**	**1**	**2.8**	**8**	**22.8**	**0**	**0**	**36**	**100**
2nd half-first year of life	**42**	**44.7**	**15**	**16**	**2**	**2.1**	**35**	**37.2**	**0**	**0**	**94**	**100**
2nd year of life	**39**	**55.7**	**8**	**11.4**	**11**	**15.8**	**7**	**10**	**5**	**7.1**	**70**	**100**
	P(x2)=0.09[NS]		**P(x2)=0.001**		**P(x2)< 0.001**				**P(x2)=0.1[NS]**			
Total	**98**	**49**	**33**	**16.5**	**14**	**7**	**50**	**25**	**5**	**2.5**	**200**	**100**

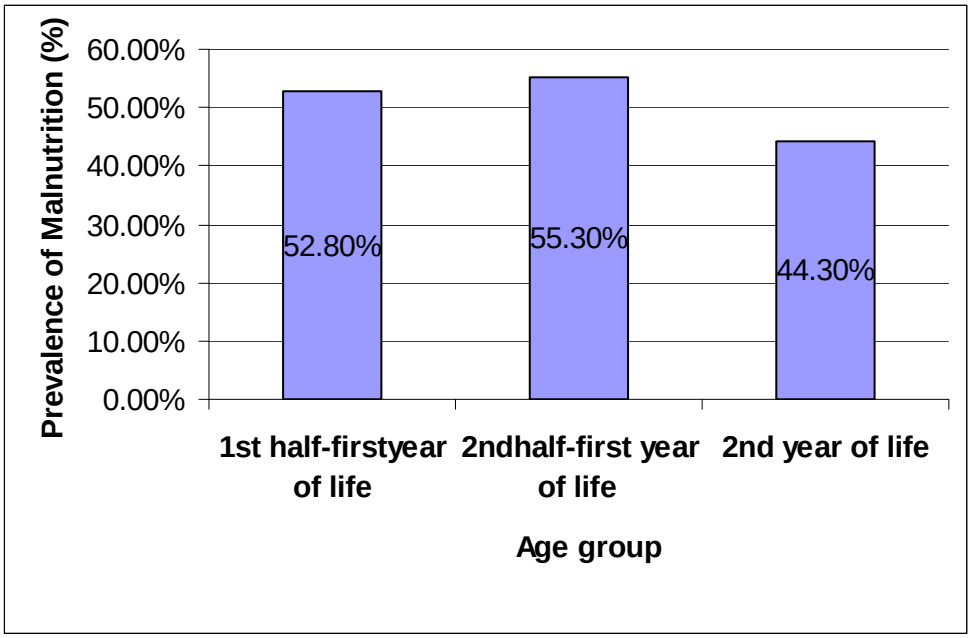

Figure 1: Prevalence of malnutrition by age

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