

EFFECTS OF BREAST AND BOTTLE FEEDING ON GROWTH AND DISEASES INFECTION OF INFANTS AT SHARKIA GOVERNORATE, EGYPT

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ABSTRACT

The present work was carried out by interviewing mothers with her infants and collecting information about type of feeding, sex, age, order of the infant in the family, birth weight and infection of diseases (diarrhea, chest allergy and gastroenteritis allergy). Anthropometric measurements of the infants (weight, length and head circumference along 3 months) were also determined.

Results indicated that the percent of first order for the infant of bottle feeding in urban was 64.5%, which was higher than the percent of the first order for the infant of breast feeding (34.3%).

Type of feeding affected the infection of diseases of the infants. The breast feeding infants had the lowest infection of disease of diarrhea, chest allergy and gastroenteritis allergy than infants of bottle feeding.

Infant birth weight of the infant was significantly differed between infants of breast and bottle feeding in urban in spite of in rural areas.

The normal growth rate of weight for both boys and girls infants were better in breast feeding infants than infants of bottle feeding by 50 percentiles. Also, the normal growth rate of length for boys and girls infants were better in breast feeding than bottle feeding by 50 percentiles. These were insignificant difference, among lengths of infant boys, while there were significant differences among lengths of infant girls.

Regarding the head circumferences of the infants, it could be seen that the normal growth of head circumferences for boys infants of breast feeding were more than infants of bottle feeding in 50 percentiles, while, there were insignificant differences in girls.

INTRODUCTION

Infant feeding as the main factor affecting growth whether is natural (breast feeding) or artificial (bottle feeding) have to be individualized. Human milk is the best food adopted to the needs of the offspring, because it's provide efficient protection against infections and actively stimulates the development of the infant's own immune system (Anon, 2003).

Birth weight was around 3750 gm had the lowest probability of artificial feeding higher and lower birth weights were positively associated with artificial feeding (Chen, 1992).

Nasim (2002) found that there were insignificant differences in growth pattern between breast-fed and formula-fed infants below 6 months and the significant differences may develop after this age. Also, Kirsten *et al.* (2001) showed that breast feeding improved linear growth and the negative relation between height for age and duration of breast feeding was due to reverse causality. Growth weight did not differ significantly according to breast feeding.

Prince *et al.*, (1998) showed that breast fed infants had a progressive and statistically significant growth for height and weight during the initial 4 months, cephalic perimeter growth was only statistically significant during the first 3 months and on the 4th month growth was not statistically significant on the group fed by a protein modified infant formula, growth was sustained and statistically significant on all 3 variables during the first 4 month.

Newburg (1999) indicated that breast fed infants have lower incidence of diarrhea. The incidence of chest infection in breast fed infant was significantly ($P < 0.01$) less than artificially fed infants (Ehab, 1997).

Mohammed, (1990) resulted that breast fed infants have significantly lowered incidence of gastroenteritis, and this explained by the protective properties of the breast milk and the easy contamination of cow's milk or artificial feeding in general in Egypt.

The present study was carried out to compare the effect of breast and bottle feeding on the infant's growth and infection of diseases at Sharkia governorate.

MATERIALS AND METHODS

A survey study was applied on a group of infant-mothers involving 131 infant-mother couples. The infants in the study were 70 breast feeding and 61 bottle feeding of age range between 4 days to 18 months. Interview of mothers was from Mother and Child Care Center at Zagazig City and some countryside Health Units in Sharkia governorate, Egypt.

The collected information included the following:

a- Infants' data:

Name, sex, age, birth weight in kilograms, order of the infant in the family and type of lactation were recorded.

b- Diseases history of the infant:

Health status of the infant, infection of diarrhea, infection of chest allergy, infection of gastroenteritis allergy was recorded.

Anthropometric measurements of infant:

Measurements used in the present work depended on the data of National Center for Health Statistics (NCHS) values (1976).

Weight:

Infants were weighted on a special scale of the beam type which allows accurate measurement up to 10 grams. This type of scale measures up to 20 kilograms.

Length:

The infant was laid on the board; the head is positioned firmly against the fixed head piece, with the eyes looking vertically. The knees extended and the feet fixed at right angles to the legs. The sliding foot piece is moved to obtain firm contact with the heels and the length is recorded to the nearest gram.

Head Circumferences:

The measurement was made with a narrow flexible non-stretch tape, while the infant's head which was steadied and the greatest circumference was measured by placing the tape firmly around the frontal bones just superior to the supraorbital ridges passing it around the head at the same

level on each side and laying it over the maximal occipital prominence. The reading was taken to the nearest 0.1 cm.

These measurements were followed up for the infants of this study for three months.

Statistical analysis:

The collected data were statistically analyzed using SPSS computer program, by using Chi Square (χ^2) to determine the significant differences between data in the infants of breast and bottle feeding.

RESULTS AND DISCUSSION

Sex of the infant:

As shown in Table (1) it was noticed that the percentage of boys who received breast feeding in urban was higher than girls (62.9 and 37.14%, respectively). The opposite was noticed in rural, whereas girls showed the highest breast feeding. The present results are coincided with those of Mahmoud (1994) and Hafez *et al.*, (1998) who reported that mother prefers to practice breast feeding and live breast feeding with her boy infant than her girl infant. The same Table also shows that percentage of boys (42.9%) of breast feeding in rural was the lowest compared to 66.7% of bottle feeding in opposite to girls of breast feeding in rural.

Table 1: Number and distribution percent of sex of infant in relation to kid feeding and area pattern.

Sex	Types of feeding and area										
	Urban					Rural				Total	
	Breast feeding		Bottle feeding		Breast feeding		Bottle feeding				
	No	%	No	%	No	%	No	%	No	%	
Boys	22	62.9	13	42.0	15	42.9	21	66.7	71	54.2	
Girls	13	37.1	18	58.1	20	57.1	9	33.3	60	45.8	
Total	35	100.0	31	100.0	35	100.0	30	100.0	131	100.0	

Chi-square urban = 2.889, df = 1 and P<0.05 Chi-square rural = 4.816, df = 1 and P<0.05

Age of the infant:

It is evident from results given in Table (2) that there are insignificant differences in urban and rural. It was found that the lowest percentage of breast feeding in urban (14.3%) was among the small age for infants of 3 – 6 months compared to bottle feeding in urban (6.5) among the small age from 0 – 3 months. While in rural, the lowest percentage of breast feeding (5.7%) and bottle feeding (6.7%) was for age 0 – 3 months.

Table 2: Number and distribution percent of infants age in relation to kid feeding and area pattern.

Infant's age	Types of feeding and area										
	Urban					Rural				Total	
	Breast feeding		Bottle feeding		Breast feeding		Bottle feeding				
	No	%	No	%	No	%	No	%	No	%	
0 – 3 months	7	20.0	2	6.5	2	5.7	2	6.7	13	9.9	
>3 – 6 months	5	14.3	8	25.8	9	25.7	9	30.0	31	23.7	
>6 -12 months	11	31.4	11	35.5	12	34.3	10	33.3	44	33.6	
>12-18 months	12	34.3	10	32.3	12	34.3	9	30.0	43	32.8	
Total	35	100.0	31	100.0	35	100.0	30	100.0	131	100.0	

Chi-square urban = 3.422, df = 3 and P>0.05 Chi-square rural = 0.227, df = 3 and P>0.05

These results are in quite agreement with those of Abdel-Wahhab (2000) and WHO (1981). They reported that the prevalence of breast feeding was prominent at a very early age and declined with increasing age of the infant.

Birth weight of babies:

Results tabulated in Table (3) indicate that, the percentage of low birth weight (2 – 3 Kg) in urban was 0.0% of infants of breast feeding compared to 6.6% of infants of bottle feeding. While, in rural the percentage of low birth weight was 2.9% of breast feeding which was higher in bottle feeding infant's being 16.7%. On another side, the low birth weights were found in infants of bottle feeding more than infants of breast feeding.

These results are in accordance with the findings of Cohen *et al.* (1999) who reported that obstacles to exclusive breast feeding were collected from Honduran mothers of low birth weight. Oconnor *et al.* (2003) suggested that, despite a slower early growth rate human milk fed low birth weight infants (LBW) have development at least comparable to that of infants fed nutrient enriched formula.

Table 3: Number and distribution percent of birth weight of babies in relation to kid feeding and area pattern.

Weight (Kg)	Types of feeding and area									
	Urban				Rural				Total	
	Breast feeding		Bottle feeding		Breast feeding		Bottle feeding			
	No	%	No	%	No	%	No	%	No	%
> 2-3	0	0.0	2	6.6	1	2.9	5	16.7	8	6.1
3-4	11	31.4	18	58.1	15	42.9	13	43.3	57	43.5
4-5	24	68.6	6	19.4	17	48.6	12	40.0	59	45.0
>5	0	0.0	5	16.1	2	5.7	0	0.0	7	5.3
Total	35	100.0	31	100.0	35	100.0	30	100.0	131	100.0

Chi-square urban = 19.318, df = 3 and P<0.01 Chi-square rural = 5.318, df = 3 and P>0.05

Order of the infant:

The percentage of the order of the first kid in urban was recorded to be 34.3% in breast feeding, which was lower than the percentage (64.5%) of bottle feeding. In rural, the first kid and second one had the highest percentages (31.4%) of breast feeding, while the second kid had the highest percentage (40.0%) of bottle feeding as shown in Table (4). So, it could be noticed that the highest percentage of the first order kid in breast feeding was noticed in urban area.

Table 4: Number and distribution percent of order of the kid in relation to kid feeding and area pattern.

Order of the infant	Types of feeding and area									
	Urban				Rural				Total	
	Breast feeding		Bottle feeding		Breast feeding		Bottle feeding			
	No	%	No	%	No	%	No	%	No	%
The 1 st kid	12	34.3	20	64.5	11	31.4	8	26.7	51	39.0
The 2 nd kid	10	28.6	5	16.1	11	31.4	12	40.0	38	29.0
The 3 rd kid	7	20.0	6	19.4	9	25.7	8	26.7	30	23.0
The 4 th Kid	6	17.1	0	0.0	4	11.4	2	6.7	12	9.2
Total	35	100.0	31	100.0	35	100.0	30	100.0	131	100.0

Chi-square urban = 6.554, df = 3 and P<0.05 Chi-square rural = 0.863, df = 3 and P>0.05

Though, the self experience of the mother is deficient in the first order baby, this obstacle though to be supported by the other member in her environment and the interest which is at its highest level with the first baby (Abdel-Wahhab, 2000).

Infection diseases of the infant:

Results given in Table (5) show that the infants of bottle feeding in urban and rural had the higher percentage of infection disease 90.3% and 86.7% respectively, while the percentage of infection disease of breast feeding in urban and rural had 42.9% and 65.7% respectively. Human milk feeding decreases the incidence and or severity of a wide range of infectious diseases (Heining, 2001).

Table 5: Number and distribution percent of infection of diseases after congenital to infants in relation to kid feeding and area pattern.

Infection of disease	Types of feeding and area										
	Urban					Rural				Total	
	Breast feeding		Bottle feeding		Breast feeding		Bottle feeding				
	No	%	No	%	No	%	No	%	No	%	
No	20	57.1	3	9.7	12	34.3	4	13.3	39	29.8	
Yes	15	42.9	28	90.3	23	65.7	26	86.7	92	70.2	
Total	35	100.0	31	100.0	35	100.0	30	100.0	131	100.0	

Chi-square urban = 16.313, df = 1 and P<0.01 Chi-square rural = 3.822, df = 1 and P≤0.05

Infection of diarrhea:

Results tabulated in Table (6) showed that there are significant differences between breast and bottle feeding in urban and rural areas. It is clear from these results that the major infection of diarrhea of bottle feeding. This might be attributed to the method of rapid boiling for sterilizing with adequate fuel, a good source of water, not only for preparing the food but also for cooling it and inadequate washing facilities for the bottle and hands. The present results agreed with the findings of Mohammed (1987) who suggested that bouts of diarrhea are more common in weaned cases than in artificially fed cases (58.1%) and in breast cases (16.6%).

Table 6: Number and distribution percent of infection of diarrhea in infants in relation to kid feeding and area pattern.

Infection of diarrhea	Types of feeding and area										
	Urban					Rural				Total	
	Breast feeding		Bottle feeding		Breast feeding		Bottle feeding				
	No	%	No	%	No	%	No	%	No	%	
No	20	57.1	3	9.7	12	34.3	4	13.3	39	29.8	
yes	15	42.9	28	90.3	23	65.7	26	86.7	92	70.2	
Total	35	100.0	31	100.0	35	100.0	30	100.0	131	100.0	

Chi-square urban = 16.313, df = 1 and P<0.01 Chi-square rural = 3.822, df = 1 and P≤0.05

Infection of chest allergy:

It was observed that infection of chest for infants in urban had the higher percentage of bottle feeding (74.2%, with significant difference). In rural, the higher percentage was recorded for bottle feeding also (76.7%) with a significant difference Table (7). Allans (1991) proved that the risk of dying from lower respiratory tract infections in rarely four times higher than among infants who are not breast fed.

Table 7: Number and distribution percent of infection of chest allergy in infants in relation to kid feeding and area pattern.

Infection of chest allergy	Types of feeding and area									
	Urban				Rural				Total	
	Breast feeding		Bottle feeding		Breast feeding		Bottle feeding			
No	%	No	%	No	%	No	%	No	%	
No	25	71.4	8	25.8	23	65.7	7	23.3	63	48.1
yes	10	28.6	23	74.2	12	34.3	23	76.7	68	51.9
Total	35	100.0	31	100.0	35	100.0	30	100.0	131	100.0

Chi-square urban = 13.687 df = 1 and P<0.01 Chi-square rural = 11.675, df = 1 and P≤0.01

Infection of gastroenteritis allergy:

As shown in Table (8), the higher percentage of infection of gastroenteritis allergy (93.5%) was for bottle feeding in urban compared to 8.6% for breast feeding in the same area. The higher percentage of infection of gastroenteritis allergy 93.3% was for bottle feeding in rural compared with 6.7% for breast feeding in rural. Mohammed (1987) reported that the babies with gastroenteritis due to cow's milk allergy often develop normal gastrointestinal function when given breast milk alone.

Table 8: Number and distribution percent of infection of gastroenteritis allergy in infants in relation to kid feeding and area pattern.

Infection gastroenteritis of	Types of feeding and area									
	Urban				Rural				Total	
	Breast feeding		Bottle feeding		Breast feeding		Bottle feeding			
No	%	No	%	No	%	No	%	No	%	
No	32	91.4	2	6.5	33	94.3	2	6.7	69	52.7
yes	3	8.6	29	93.5	2	5.7	28	93.3	62	47.3
Total	35	100.0	31	100.0	35	100.0	30	100.0	131	100.0

Chi-square urban=47.528, df=1 and P<0.001 Chi-square rural = 49.901, df = 1 and P<0.001

Anthropometric measurements for infants:

Villalpardo and Lopez-Alarcon (2000) accepted the relative to Nutritional Center for Health Statistics (NCHS) values, infants had lower mean birth weight than a sample of American and European breast fed infants. At 6 months of age, body weight of breast fed infant caught up to the weight of NCHS standards, while, formula fed infants fell to around 1 NCHS – Z score for weight and length.

Nutrition is the most important factor which affects the growth of the infant. Each infant must receive nutritive substances from external sources for growth and development processes.

Weight / age percentiles:

Data in Figures 1, 2, 3 and 4 as well as Tables 9 and 10 show the weight/age percentiles of both boys and girls of both breast and bottle feeding.

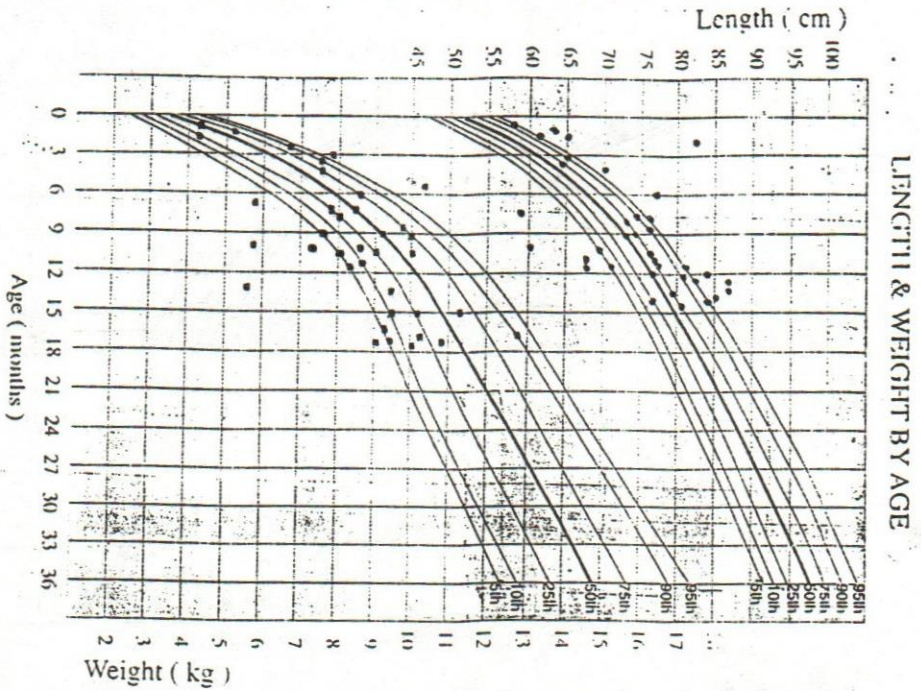


Figure 1: Distribution of weight and length percentiles of breast feeding boys on NCHS growth curves (1976).

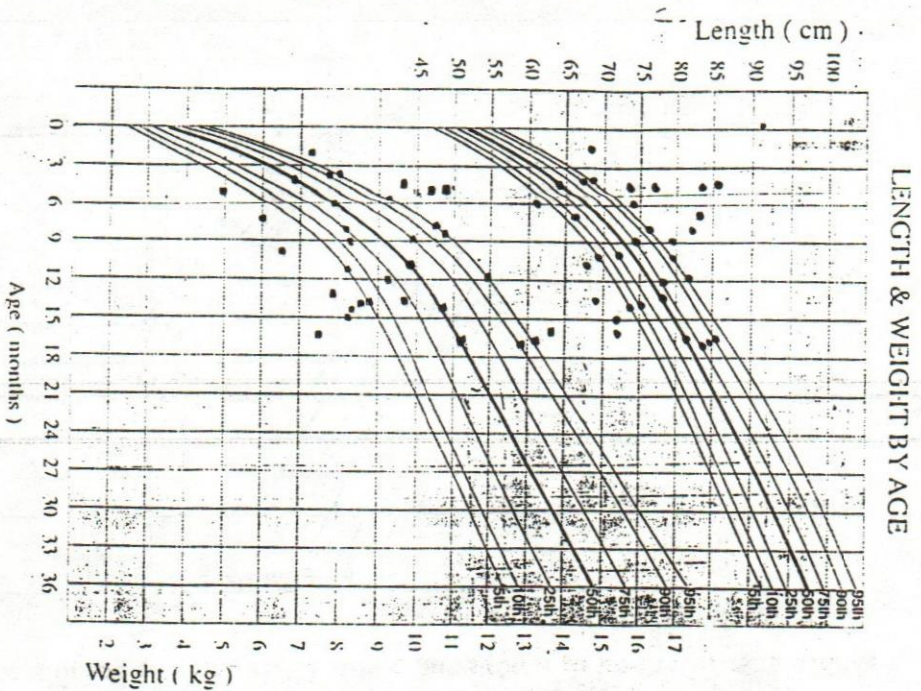


Figure 2: Distribution of weight and length percentiles of bottle feeding boys on NCHS growth curves (1976).

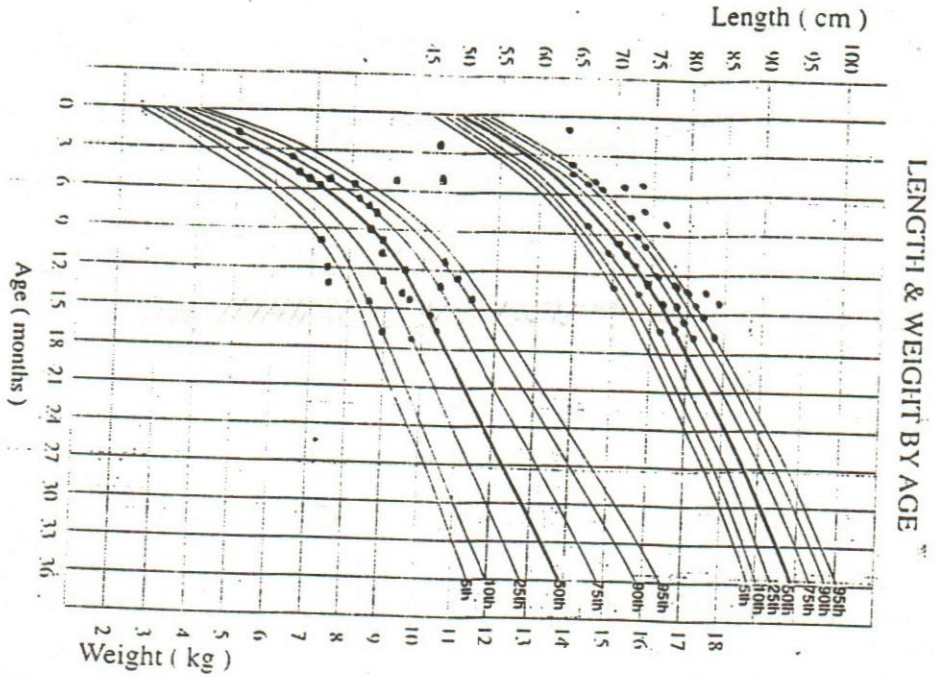


Figure 3: Distribution of weight and length percentiles of breast feeding girls on NCHS growth curves (1976).

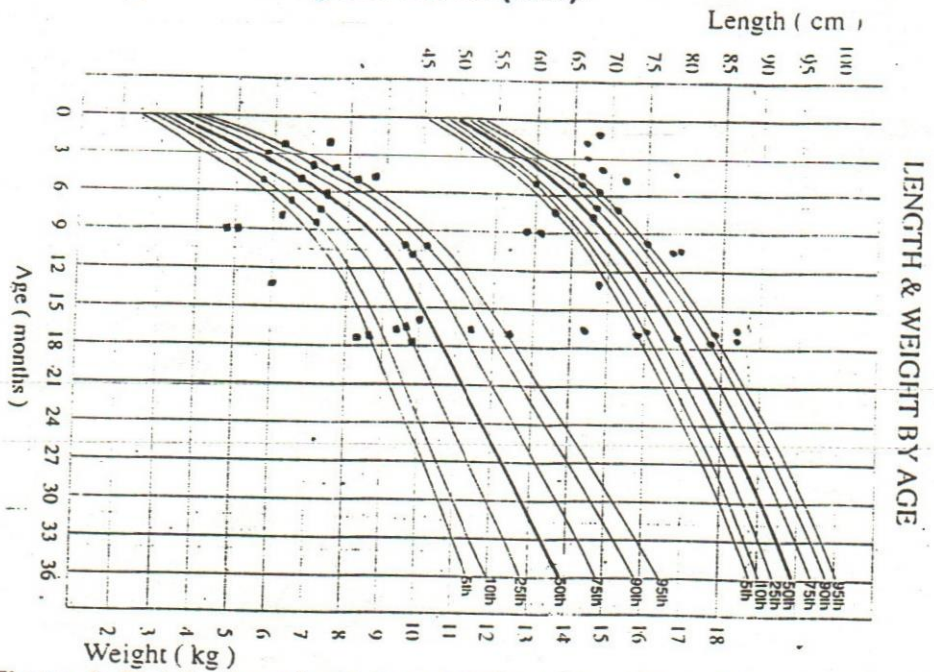


Figure 4: Distribution of weight and length percentiles of bottle feeding girls on NCHS growth curves (1976).

It is clear that the percentages of low abnormal and low normal W/R percentiles were much lower among breast fed infants than bottle feeding, and this resulted in a high significant difference between boys and girls. Abdel-Wahhab (2000) found that the 25 – 75 of the percentiles were high in breast feeding than in bottle feeding. Ricco *et al.* (2001) obtained the weight of breast fed boys and girls who were always statistically equal or higher than those of infants fed cow's milk or those of NCHS standards.

Table 9: Weight / age percentiles of boys in relation to kids feeding pattern.

Percentiles	Weight of boys				Total	
	Breast feeding		Bottle feeding			
	No.	%	No.	%	No.	%
<5 th	6	16.2	8	24.2	14	20.0
5 – 25 th	14	37.8	6	18.2	20	28.6
25 – 75 th	14	37.8	6	18.2	20	28.6
75 – 95 th	1	2.7	8	24.2	9	12.9
> 95 th	2	5.4	5	15.2	7	10.0
Total	37	100.0	33	100.0	70	100.0

Chi square = 13.231, df = 4 P≤0.01

Table 10: Weight / age percentiles of girls in relation to kids feeding pattern.

Percentiles	Weight of girls				Total	
	Breast feeding		Bottle feeding			
	No.	%	No.	%	No.	%
<5 th	2	6.1	5	17.9	7	11.5
5 – 25 th	6	18.2	8	28.6	14	23.0
25 – 75 th	18	54.5	6	21.4	24	39.3
75 – 95 th	4	12.1	7	25.0	11	18.0
> 95 th	3	9.1	2	7.1	5	8.2
Total	33	100.0	28	100.0	61	100.0

Chi square = 8.235, df = 4 P<0.05

Length / age percentiles:

Length / age percentiles of both boys and girls for breast and bottle feeding are shown in Figures 1, 2, 3 and 4 and Tables 11 and 12. It is evident from the data that the percentages of low abnormal and low normal L/A percentiles were much lower among breast feeding than bottle feeding. The present results are in accordance with those of Abdel-Wahhab (2000) who observed that with regard to length /age percentiles which found to be 75 – 95 of percentiles were high in breast feeding than bottle feeding. Abdel-Rahman (1994) reported that the length in the different groups studied, where there is a significant difference between the cow's milk fed group versus breast and formula fed group as well as between breast and cow's milk fed versus breast and formula fed groups. Also, the present results agreed with those of Khameis (1993) who stated that deviation in weight per age was more than the deviation in length per age. Ricco *et al.* (2001) reported that

breast fed boys presented significantly longer length than bottle fed boys but shorter than NCHS standards and breast fed girls presented significantly shorter length than both bottle fed girls and than NCHS standards.

Table 11: Length / age percentiles of boys in relation to kids feeding pattern.

Percentiles	Length of boys				Total	
	Breast feeding		Bottle feeding			
	No.	%	No.	%	No.	%
<5 th	4	10.8	5	15.2	9	12.9
5 – 25 th	3	8.1	6	18.2	9	12.9
25 – 75 th	10	27.0	6	18.2	16	22.9
75 – 95 th	11	29.7	7	21.2	18	25.7
> 95 th	9	24.3	9	27.3	18	25.7
Total	37	100.0	33	100.0	70	100.0

Chi square = 2.781, df = 4 P>0.05

Table 12: Length / age percentiles of girls in relation to kids feeding pattern.

Percentiles	Length of girls				Total	
	Breast feeding		Bottle feeding			
	No.	%	No.	%	No.	%
<5 th	0	0.0	4	14.3	4	6.6
5 – 25 th	5	15.2	4	14.3	9	14.8
25 – 75 th	10	30.3	3	10.7	13	21.3
75 – 95 th	11	33.3	7	25.0	18	29.5
> 95 th	7	21.2	10	35.7	17	27.9
Total	33	100.0	28	100.0	61	100.0

Chi square = 8.949, df = 4 P<0.05

Head circumference / age percentiles:

Head circumference / age percentiles of boys and girls in relation to kid feeding are found in Figures 5 and 6 as well as Tables 13 and 14. It could be observed that the percentages of low abnormal and low normal head circumference of boys were much lower among breast feeding group than bottle feeding and this resulted in high significant difference. The trend of the obtained data is in agreement with those of Abdel-Rahman (1994).

Figures 5 and 6 showed that the percentages of low abnormal and low normal head circumference for girls which were much lower among bottle feeding than breast feeding. The present results agreed with those of Alaa (1990) who stated that the growth in head circumference for age and in weight for length was statistically better in pure breast fed infants than those of artificially fed.

In the light of the results, breast feeding must be recommended for the normal growth of infants and their protection against infection diseases.

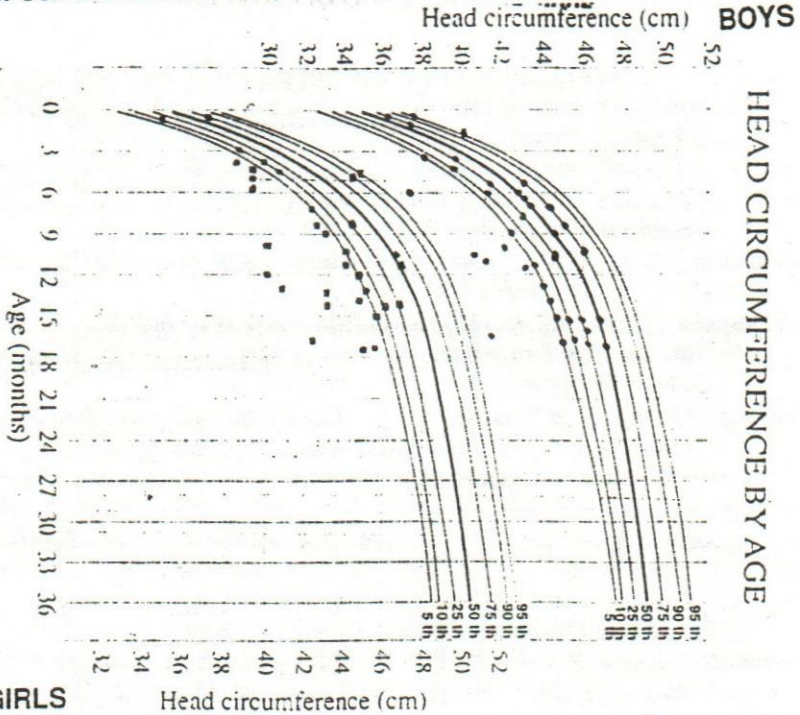


Figure 5: Distribution of head circumference percentiles of breast feeding infants on NCHS growth curves (1976).

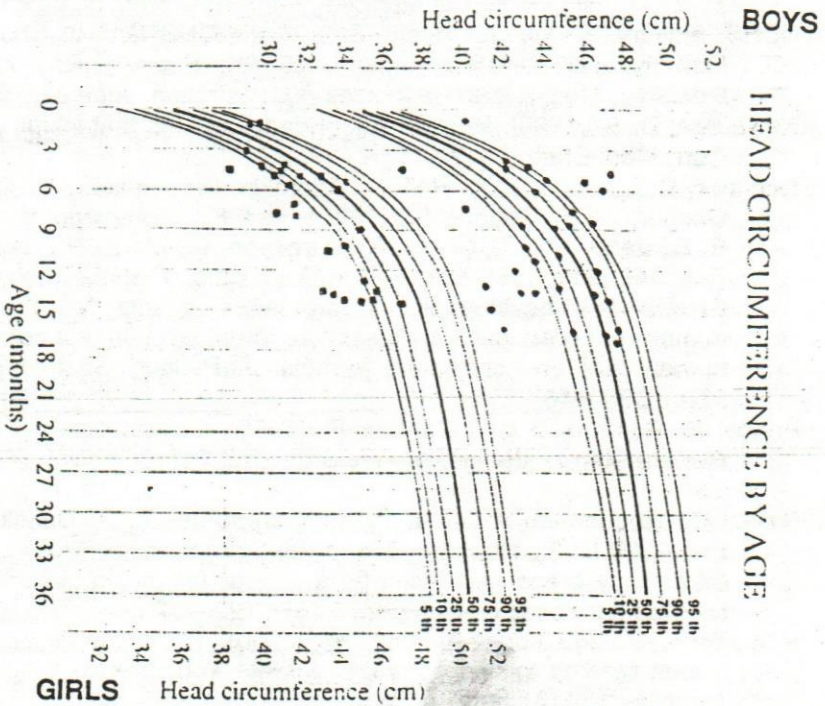


Figure 6: Distribution of head circumference percentiles of breast feeding infants on NCHS growth curves (1976).

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Table 13: Head circumference / age percentiles of boys in relation to kids feeding pattern.

Percentiles	Head circumference of boys				Total	
	Breast feeding		Bottle feeding			
	No.	%	No.	%	No.	%
<5 th	6	16.2	8	24.2	14	20.0
5 – 25 th	18	48.6	6	18.2	24	34.3
25 – 75 th	12	32.4	10	30.3	22	31.4
75 – 95 th	1	8.7	6	18.2	7	10.0
> 95 th	0	0.0	3	9.1	3	4.3
Total	37	100.0	33	100.0	70	100.0

Chi square = 12.852, df = 4 P≤0.01

Table 14: Head circumference / age percentiles of girls in relation to kids feeding pattern.

Percentiles	Head circumference of girls				Total	
	Breast feeding		Bottle feeding			
	No	%	No.	%	No.	%
<5 th	16	48.5	9	32.1	25	41.0
5 – 25 th	11	33.3	13	46.4	24	39.3
25 – 75 th	4	12.1	5	17.9	9	14.8
75 – 95 th	2	6.1	1	3.6	3	4.9
> 95 th	0	0.0	0	0.0	0	0.0
Total	33	100.0	28	100.0	61	100.0

Chi square = 2.176, df = 3 P>0.05

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تأثيرات الرضاعة الطبيعية و الصناعية على النمو و مدى الإصابة بالأمراض
للأطفال الرضع بمحافظة الشرقية - مصر
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أجري استبيان لأمهات الرضاعة الطبيعية والصناعية لجمع معلومات عن أطفالهن الرضع كنوع الرضاعة و الجنس و العمر ووزن الميلاد ومدى الإصابة بالأمراض (مثل الإسهال و حساسية الصدر و حساسية الجهاز الهضمى للطفل الرضيع) و كذلك تم أخذ القياسات الأنتروبومترية للأطفال الرضع المتمثلة في الوزن، الطول، محيط الرأس لمدة ثلاثة أشهر من المتابعة.

أوضحت النتائج أن ترتيب الطفل الرضيع الأول كان أعلى بنسبة ٦٤,٤% بالرضاعة الصناعية بالحضر عن ترتيبه بالرضاعة الطبيعية (٣٤,٤%). كما وجدت فروق معنوية بين جنس الطفل ونوع الرضاعة والمنطقة. كما دلت الدراسة على أن نوع الرضاعة له تأثيراً على الإصابة بالأمراض للطفل حيث كانت أقل الإصابات بالإسهال و حساسية الصدر و حساسية الجهاز الهضمى بأطفال الرضاعة الطبيعية عن أطفال الرضاعة الصناعية.

كما أوضحت النتائج أن هناك فرقاً معنوياً في وزن الميلاد ونوع الرضاعة بالحضر وعلى العكس من ذلك بالريف وأن المعدل الطبيعي للنمو في وزن الأطفال الذكور و الإناث بالرضاعة الطبيعية أكثر منه في أطفال الرضاعة الصناعية عند 50 percentiles وأيضاً معدل الزيادة الطبيعي لطول ذكور و إناث الرضاعة الطبيعية أكثر عن ذكور و إناث الرضاعة الصناعية عن 50 percentiles بالرغم من وجود فروق معنوية بين الذكور ونوع الرضاعة، بينما لا توجد تلك الفروق بين الإناث ونوع الرضاعة، كما اتضح أن معدل النمو الطبيعي لمحيط الرأس بذكور الرضاعة الطبيعية أكثر من ذكور الرضاعة الصناعية عن 50 percentiles وعلى العكس من ذلك الإناث. لذلك توصي هذه الدراسة بأهمية الرضاعة الطبيعية لنمو الطفل و حمايته من الأمراض.