AIM OF THE WORK

The aim of the present work was to study the possible health outcomes of early versus optimal introduction of foods to exclusively breast fed infants.

SUBJECTS AND METHODS

I. Research strategy:

A cross-sectional survey was conducted.

II. Research settings:

- The outpatient clinic of Alexandria University Children's Hospital

- Two family health centers in Alexandria which are:

San Stefano family health center as an urban area.

Mohsen family health center as a rural area.

III. Target population:

Infants aged one year attending the research setting were divided into two groups:

Group I: exclusively breast fed infants for three months.

Group II: exclusively breast fed infants for six months.

IV. Inclusion criteria:

1. Infants aged one year.

2. Exclusive breastfeeding for complete three or six months.

V. Exclusion criteria:

1. History of congenital anomalies.

2. History of chronic disease (diabetes mellitus, cystic fibrosis, gastro-esophageal reflux disease and chronic renal disease).

3. History of any surgical interventions that affect growth and development (intestinal obstruction, fractures and cleft palate repair).

VI. Research duration:

The research was conducted at 2012

VII. Data collection tools:

Interviewing schedule (Appendix I) was developed and used by the researcher himself to collect data about:

1) Sociodemographic features of infants.

* As gender, residence, mother′s education, mother′s age and infant order

2) Nutrional history of the child.

* Breastfeeding practices either regular or irregular, day and night or day only and from one breast or both.

* Breastfeeding satisfaction for the infant and numbers of feds per day.

3) Complementary feeding practices.

* The beginning of complementary feeding and who advice the mother to start at that time.

* Type of complementary food (milk products, vegetables& Fruits, easy made food, carbohydrates and animal proteins)

* The amount of complementary food and the way which infant takes his food.

* Vitamins supplementation either vitamin D or multivitamins and duration of intake.

* Iron supplement and duration of intake.

4) Child development (gross and fine motor, social and language).

* The time when the child start to:

Sit down without support, stand up with assistance, hand –knee crawl, walk with assistance, stand alone and walk alone (Appendix II).[47]

* If the child can:

Transfer objects from one hand to another, infant hold a pencil correctly, leave objects when requested and eat independently.

* To know if the child can:

Understand and respond to his mother′s call, play with others simple games and speak one or two meaningful words.

5) Medical history of the child (present and past history)

* To know the rate of catching infection either respiratory tract as bronchiolitis and pneumonias or gastrointestinal tract as gastroenteritis.

* If allergic diseases developed as skin, respiratory and gastrointestinal tract allergy.

* To know the number and causes of any hospital admission.

6) Family history of atopic conditions.

To know if there is family history of any atopic conditions that may affect the occurrence of allergic diseases in the child.

7) Anthropometric measurements of the child including weight, height and head circumference.

To compare with normal percentile for age and sex and find out the abnormal weight, height and head circumference using World Health Organization child growth standards. [48]

VIII. Procedure of data collection:

1. Agreement:

An official approval for conducting the study was obtained from the post-graduate research and ethics committees and the heads of the two family health centers where the study was conducted.

2. Sampling:

- All infants aged approximately one year attending the outpatient clinic of Alexandria University Children's Hospital.

- All infants attending San Stefano and Mohsen family health centers for immunization schedule of one year (MMR vaccine).

- Two hundred infants were included in the study 95 were complete breast feeding for three months and 105 complete breast feeding for six months of age.

3. Collection of data:

The interview was conducted individually. Participants were those who were present at the day of random visits to the two family health centers. Visits were repeated to each center till completion of the intended number of infants to be included in the study.

The investigator was responsible for data collection throughout the research activities to control the data collection procedures.

IX. Data processing and analysis:

Data entry was performed using the Statistical Package of Social Sciences (SPSS ver. 21).[49]

1. Data processing:

Data processing had two major objectives namely cleaned data by performing a series of comprehensive checks and producing results which involved coding and recoding of variables.

2. Data analysis: [50]

Data were fed to the computer and analyzed using IBM **SPSS software package version 21.** Qualitative data were described using number and percent. Quantitative data were described using Range (minimum and maximum), mean, standard deviation and median. Comparison between different groups regarding categorical variables was tested using Chi-square test. When more than 20% of the cells have expected count less than 5, correction for chi-square was conducted using Fisher's Exact test or Monte Carlo correction. The distributions of quantitative variables were tested for normality using Kolmogorov-Smirnov test, Shapiro-Wilk test and D'Agstino test, also Histogram and QQ plot were used for vision test. If it reveals normal data distribution, parametric tests was applied. If the data were abnormally distributed, non-parametric tests were used. For normally distributed data, comparison between two independent population were done using independent t-test. For abnormally distributed data, comparison between two independent population were done using Mann Whitney test. Significance of the obtained results was judged at the 5% level.

X. Ethical considerations:

- A collective consent from college administrative board and research ethics committee was obtained before conducting the study. Objectives of the study, types of information to be obtained and the expected benefits of the study were explained in order to obtain this approval.

- All participants were asked permission ahead of time before being enrolled in the study. This purpose, methods and expected outcomes of the study were explained to them. Each participant voluntary agreed to participate in the study.

- The interview took place in private as much as possible. Moreover, mothers were assured of the confidentiality of the conversation.

RESULTS

The total number of breastfed infants was two hundred infants. Ninety five of them were starting weaning at three months of age and the rest 105 experienced optimal weaning at six months of age.

Table (I) shows Socio-demographic features of breast-fed infants. More than one third (37.1%) of infants experienced optimal breast feeding were living in rural areas while less than half of infants (43.2%) experienced early feeding were living in urban areas. There was no statistical significant difference between infants experienced early weaning and those experienced optimal breast feeding in residence (P=.185).

Also, being the second baby constituted less than half (45.3%) among those experienced early weaning and more than half (54.3%) among those experienced optimal breast feeding. The difference was not statistically significant (P=0.064).

Table (I):   **Socio-demographic features of breast-fed infants**

Socio-demographic features	Time of food introduction				χ^2	p
	3 months (n = 95)		6 months (n = 105)			
	No.	%	No.	%		
Gender						
Male	37	42.5	50	48.7	1.52	0.217
Female	58	57.5	55	51.3		
Residence						
Rural	25	26.3	39	37.1		
Semi-Urban	29	30.50	32	30.50	3.372	0.185
Urban	41	43.20	34	32.40		
Infant Order						
First	37	38.9	27	25.7		
Second	43	45.3	57	54.3	6.856	[MC]p=0.064
Third	15	15.8	17	16.2		
Fourth	0	0.0	4	3.8		

χ^2: Chi square test

MC: Monte Carlo test

*: Statistically significant at p ≤ 0.05

Table (II): Shows mother's education of the studied infants.

As regard educational level of the mothers, more than half (52.7%) of mothers of infants experienced early weaning had secondary education compared to about one third of mothers (32.4%) of infants experienced optimal breast feeding were secondary graduates and half of mothers (51.4%) of infants experienced optimal breast feeding were university graduates, there was statistical significant difference between the two group as regard educational level (P=0.017).

Table (II):   Mother's education of the studied infants.

Mother Education	Time of food introduction				χ^2	^{MC}p
	3 months (n = 95)		6 months (n = 105)			
	No.	%	No.	%		
Illiterate	2	2.1	7	6.7		
Primary	4	4.2	3	2.9		
Preparatory	8	8.4	7	6.7	11.730	0.017*
Secondary	50	52.7	34	32.4		
University	31	32.6	54	51.4		

χ^2: Chi square test
MC: Monte Carlo test
*: Statistically significant at $p \leq 0.05$

Table (III): Shows mother's age/years of the studied infants.

The mean mother's age of infants experienced early weaning was 25.40±4.038 years compared to 26.7±3.308 years of mothers of optimal beast fed babies. The difference was statistically significant (p=.014).

Table (III):   Mother's age/years of the studied infants.

Mother's Age	Time of food introduction		t	p
	3 months (n = 95)	6 months (n = 105)		
Min. – Max.	14.0 – 34.0	19.0 – 37.0		
Mean ± SD.	25.40 ± 4.038	26.7 ± 3.308	2.490*	0.014*
Median	25.0	27.0		

t: Student t-test
*: Statistically significant at $p \leq 0.05$

Feeding history:

Table (IV) shows breast feeding history of the infants.

Almost all infants (98.1%) experienced optimal breast feeding had scheduled breast feeding compared to (87.4%) experienced early feeding. There was statistical significant difference between the two group as regard the nature of feeding (P<0.001).

As regard day and night feeding almost all infants (98.1%) experienced optimal breast feeding had day and night breast feeding compared to 88.4% experienced early feeding. There was statistical significant difference between the two group as regard the time of breast feeding (P=0.006).

Almost all infants (99%) experienced optimal breast feeding fed from both breasts compared to 84.2% experienced early feeding. There was statistical significant difference between the two groups as regard feeding practice (P< 0.001).

Although all signs of adequacy of breast feeding were not expressed in both groups except being quite and sleeps after feeding but the difference was statistically significant between two groups (P<.001).

Table (IV):   Breast feeding history of the studied infants.

Breast feeding history	Time of food introduction				Test of sig.	p
	3 months (n = 95)		6 months (n = 105)			
	No.	%	No.	%		
Nature of feeding						
Scheduled	83	87.4	103	98.1	χ^2= 8.815[*]	<0.001[*]
On demand	12	12.6	2	1.9		
Time of feeding						
Day& night	84	88.4	103	98.1	χ^2= 7.68[*]	0.006[*]
Mainly on day	11	11.6	2	1.9		
Feeding from one breast						
Yes	15	15.80	1	1	χ^2= 14.918[*]	<0.001[*]
No	80	84.20	104	99		
Adequacy of breast feeding						
Yes	61	64.20	101	96.19	χ^2= 28.195[*]	<0.001[*]
No	34	35.80	4	3.80		
Signs of adequacy of breast feeding	(n = 61)		(n = 101)			
At least 8 times feeding per day	1	1.1	15	14.3		
Quiet and sleeps after feeding	53	55.8	58	55.2		
Normal defecation	2	2.1	4	3.8	χ^2= 18.150[*]	<0.001[*]
Urination >6 times/day	1	1.1	2	1.9		
More than two signs	4	4.2	22	21.0		

χ^2: Chi square test
MC: Monte Carlo test
t: Student t-test
*: Statistically significant at $p \leq 0.05$

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Table (V): Shows frequency of breast feeding.

The mean number of feds of infants experienced early weaning was 6.694±1.720 compared to 7.476±1.153 of optimal beast fed babies. The difference was statistically significant (P<.001).

Table (V):   **Frequency of breast feeding.**

Number of breast feeding per day	Time of food introduction		t	p
	3 months (n = 95)	**6 months (n = 105)**		
Min. – Max.	5.0 – 9.0	5.0 – 10.0	4.884[*]	<0.001[*]
Mean ± SD.	6.64 ± 1.26	7.48 ± 1.15		
Median	6.0	8.0		

Table (VI) shows that more than half (61%) of mothers of infants had experienced optimal breast feeding practice were advised by doctors compared to majority (90.5%) of mothers of infants had experienced early weaning practice were advised by relatives as regard food introduction. There was statistical significant difference between the two groups (P<.001)

Also taking food actively constituted 70.5% among those experienced early weaning and 81% among those experienced optimal breast feeding. The difference was not statistically significant (P=0.085).

Table (VI):   Weaning practice of the studied infants.

Weaning practice	Time of food introduction				χ^2	p
	3 months (n = 95)		6 months (n = 105)			
	No.	%	No.	%		
The person who advised the mother for food introduction?						
The Doctor	6	6.3	64	61.0		
The Nurse	2	2.1	4	3.8	97.411	<0.001*
The Relatives	86	90.5	26	24.8		
Mass media	1	1.1	11	10.4		
Technique of taking the food						
Active feeding	67	70.5	85	81.0	2.972	0.085
Forced feeding	28	29.5	20	19.0		

χ^2: Chi square test
*: Statistically significant at $p \leq 0.05$

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Table (VII): Shows type of food intake: about half (58.1%) among those experienced optimal breast feeding were fed on milk product compared to nearly three quarter (72.6%) among those experienced early weaning. The difference was statistically significant (P=0.031).

Fifty five percent experienced early weaning were fed on vegetables and fruits compared to 83.8% experienced optimal breast feeding. The difference was statistically significant (P<.001).

Forty three percent of infants experienced optimal feeding were fed on readymade food compared to 27.4% among those experienced early weaning. The difference was statistically significant (P=0.002).

Sixty four percent experienced early weaning were fed on cereals compared to 46.7% experienced optimal breast feeding. The difference was statistically significant (P=.013).

None of infants experienced early weaning were fed on animal proteins compared to (6.7%) among those experienced optimal breast feeding. The difference was statistically significant (P=.015).

Table (VII):   Type of food intake by the studied infants.

Food Type	Time of food introduction				χ^2	p
	3 months (n = 95)		6 months (n = 105)			
	No.	%	No.	%		
Milk and milk products	69	72.6	61	58.1	4.63*	0.031*
Vegetables and Fruits	53	55.8	88	83.8	18.82	<0.001*
Readymade Food	26	27.4	45	42.9	5.22*	0.002*
Cereals	61	64.2	49	46.7	6.20*	0.013*
Animal proteins	0	0.0	7	6.7	6.563*	FEp=0.015*

χ^2: Chi square test
FE: Fisher Exact test
*: Statistically significant at $p \leq 0.05$

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Table (VIII) shows two thirds (67.6%) of infants experienced optimal breast feeding had vitamins supplements compared to 35.8% of infants experienced early feeding. The difference was statistically significant (P<.001).

More than one third (39%) of infants experienced optimal breast feeding had iron supplements compared to 21.1% of infants experienced early feeding. the difference was statistically significant (P=.006).

Table (VIII): Micronutrient supplementation

Micronutrient supplementation	Time of food introduction				χ^2	p
	3 months		6 months			
	No.	%	No.	%		
Vitamins supplements	**(n = 95)**		**(n = 105)**			
No	61	64.2	34	32.4	20.26*	<0.001*
Yes:	34	35.8	71	67.6		
• Multi-vitamins	14	14.7	54	13.3		
• Vitamin D	20	21.1	17	19.0		
Iron supplements						
No	75	78.9	64	61.0	7.61*	0.006*
Yes	20	21.1	41	39.0		

χ^2: Chi square test
*: Statistically significant at $p \leq 0.05$

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Table (IX): Duration of micronutrient supplementation

The mean duration of vitamins intake was 1.31±0.57 month among infants experienced early weaning compared to 1.58±0.82 month among those with optimal weaning. There was statistical significant difference between both groups (p=0.051).

The mean duration of iron supplements was 1.65±1.04 month among infants experienced early weaning compared to 1.09±0.44 month among those with optimal weaning. There was statistical significant difference between both groups (p=0.032).

Table (IX):   Duration of micronutrient supplementation

Duration of micronutrient supplementation	Time of food introduction		t	p
	3 months	**6 months**		
Duration of vitamins intake (month)	**(n = 35)**	**(n = 72)**		
Min. – Max.	0.50 – 3.0	1.0 – 4.0		
Mean ± SD.	1.31 ± 0.57	1.58 ± 0.82	1.974	0.051[*]
Median	1.0	1.0		
Duration of iron intake (month)	**(n = 20)**	**(n = 40)**		
Min. – Max.	1.0 – 5.0	0.25 – 3.0		
Mean ± SD.	1.65 ± 1.04	1.09 ± 0.44	2.293[*]	0.032[*]
Median	1.0	1.0		

t: Student t-test

*: Statistically significant at p ≤ 0.05

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Table (X) shows gross motor development (in percentile) among studied infants.

As regard sitting down without support, the majority (80%) of infants experienced optimal breast feeding were in normal percentile (25th-50th, 50th-75th) compared to more than half (55.9%) of infants experienced early feeding. The difference was statistically significant (P=.004).

As regard standing up with assistance, seventy eight percent of infants experienced optimal breast feeding were in normal percentile (25th-50th, 75th-97th) compared to 57.9% of infants experienced early feeding. The difference was statistically significant (P<.001).

As regard hand-knee crawling, two thirds (68.6%) of infants experienced optimal breast feeding were in normal percentile (25th-50th, 50th-75th) compared to 55% of infants experienced early feeding. The difference was not statistically significant (P=.08).

As regard walking with assistance two thirds (66.7%) of infants experienced optimal breast feeding were in normal percentile (50th-75th, 75th-97th) compared to 80.2% of infants experienced early feeding. The difference was statistically significant (P<.001).

As regard standing alone, eighty nine percent of infants experienced optimal breast feeding were in normal percentile (25th-50th, 50th-75th) compared to 83.9% of infants experienced early feeding. The difference was statistically significant (P=.005).

As regard walking alone, nearly all (95.3%) infants experienced optimal breast feeding were in normal percentile (25th-50th) compared to the majority (85%) of infants experienced early feeding. The difference was not statistically significant (P=.122).

Table (X): Comparison between 3 & 6 months age groups as regard gross motor development (in percentile).

Gross motor development (in percentile)	Time of food introduction				χ^2	p
	3 months		6 months			
	No.	%	No.	%		
Age of sitting down without support	**(n = 93)**		**(n = 105)**			
3rd-25th	23	24.7	11	10.5		
25th-50th	28	30.1	41	39.0		
50th-75th	24	25.8	43	41.0	15.40*	0.004*
75Th-97th	18	19.4	9	8.6		
>97th	0	0.0	1	1.0		
Age of standing up with assistance	**(n = 95)**		**(n = 105)**			
3rd-25th	7	7.4	0	0.0		
25th-50th	26	27.4	49	46.7		
50th-75th	12	12.6	22	21.0	35.02*	<0.001*
75Th-97th	29	30.5	33	31.4		
>97th	21	22.1	1	1.0		
Age of hand –knee crawling	**(n = 91)**		**(n = 102)**			
3rd-25th	12	13.2	4	3.9		
25th-50th	30	33.0	41	40.2	6.77	0.08
50th-75th	20	22.0	29	28.4		
75Th-97th	29	31.9	28	27.5		
Age of walking with assistance	**(n = 86)**		**(n = 99)**			
3rd-25th	12	14.0	11	11.1		
25th-50th	5	5.8	22	22.2	19.002*	<0.001*
50th-75th	23	26.7	39	39.4		
75Th-97th	46	53.5	27	27.3		
Age of standing alone	**(n = 62)**		**(n = 90)**			
3rd-25th	10	16.1	10	11.1		
25th-50th	13	21.0	42	46.7	10.737*	MCp=0.005*
50th-75th	39	62.9	38	42.2		
Age of walking alone	**(n = 20)**		**(n = 86)**			
3rd-25th	3	15.0	4	4.7	2.818	FEp=0.122
25th-50th	17	85.0	82	95.3		

χ^2: Chi square test

MC: Monte Carlo test

FE: Fisher Exact test

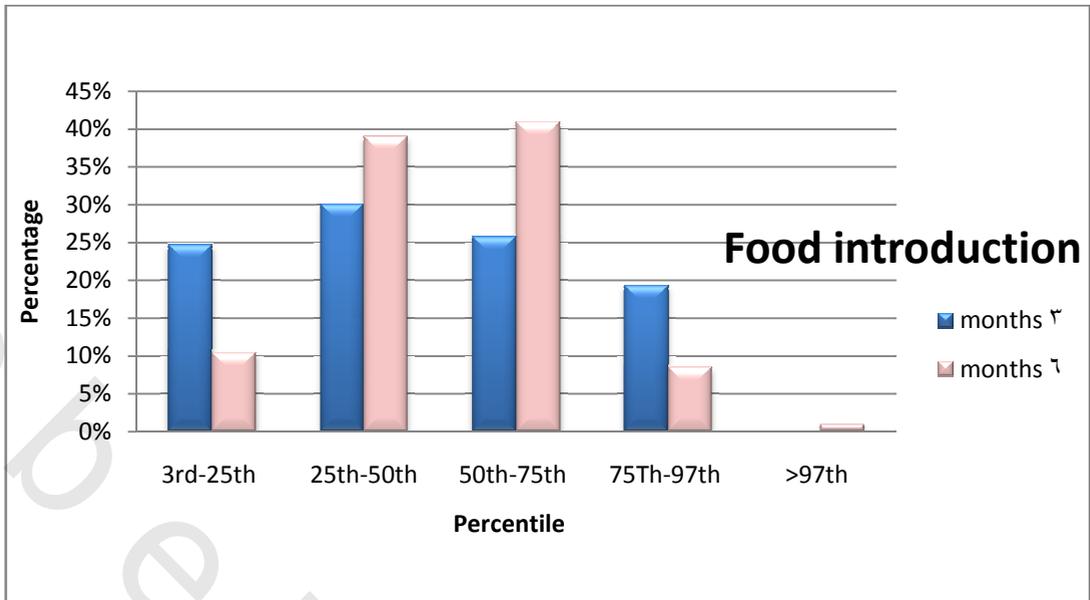*: Statistically significant at $p \leq 0.05$

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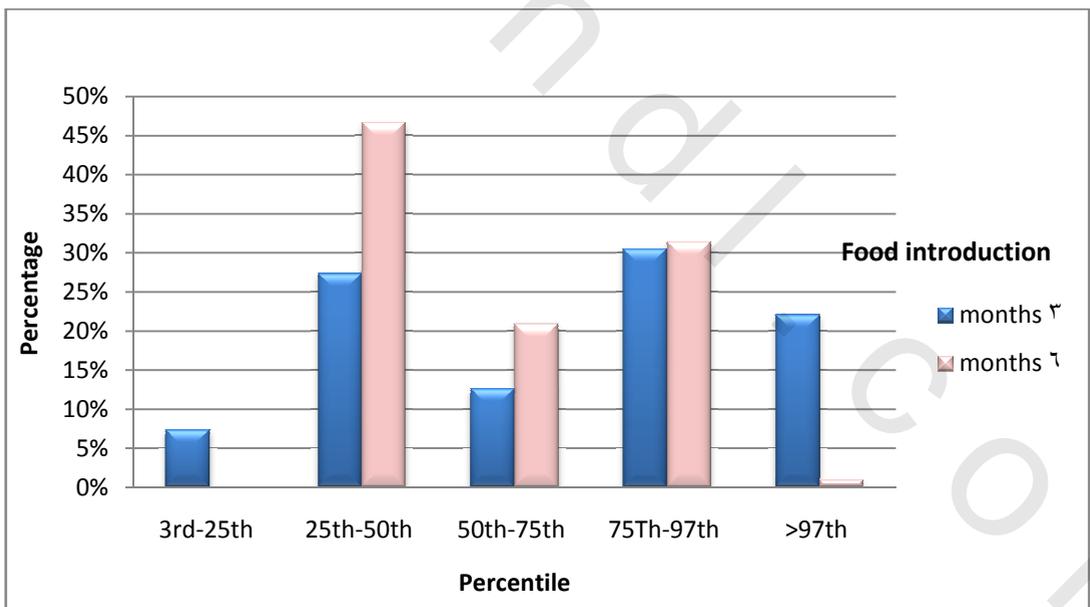**Figure (4): Relation between time of food introduction and time of sitting down without support in percentile.**

Figure (5): Relation between time of food introduction and time of standing up with support in percentile.
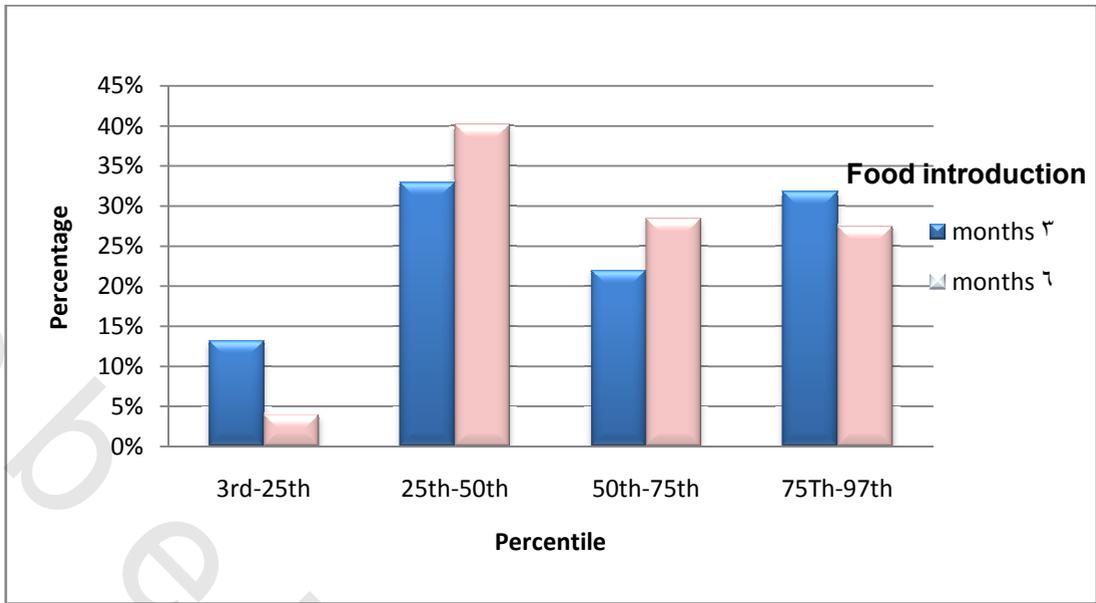
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Figure (6): Relation between time of food introduction and time of hand –knee crawling in percentile.
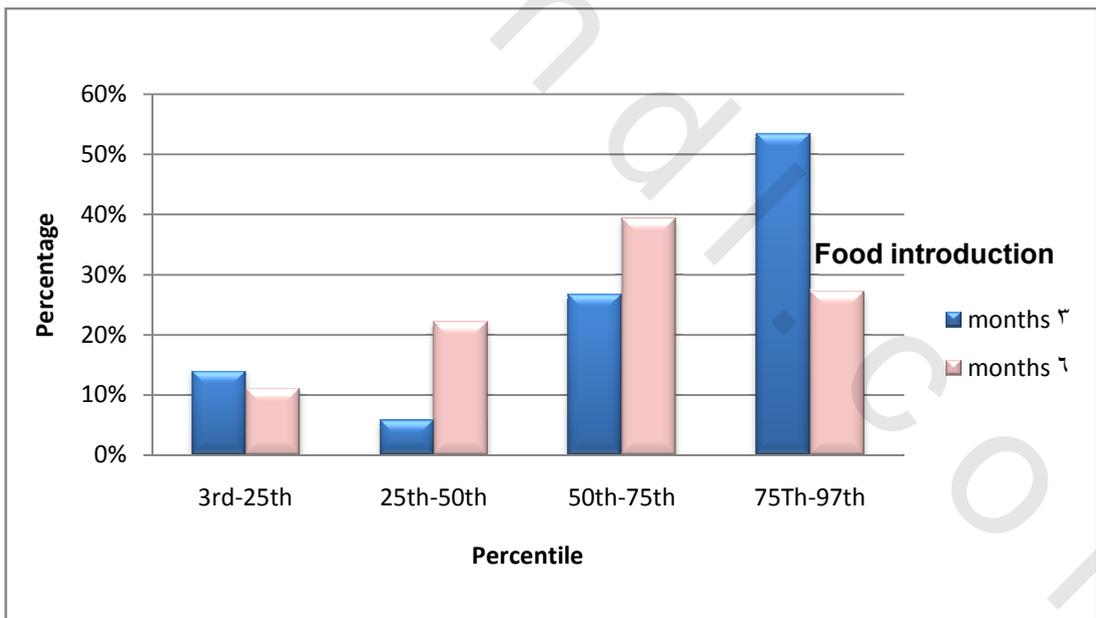

Figure (7): Relation between time of food introduction and time of walking with assistance in percentile.
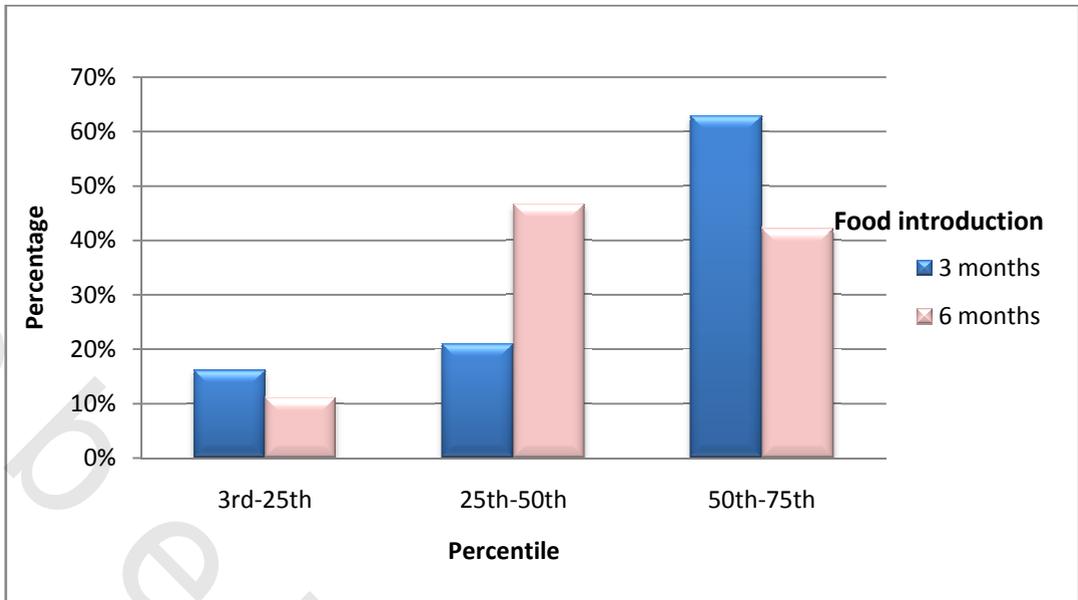
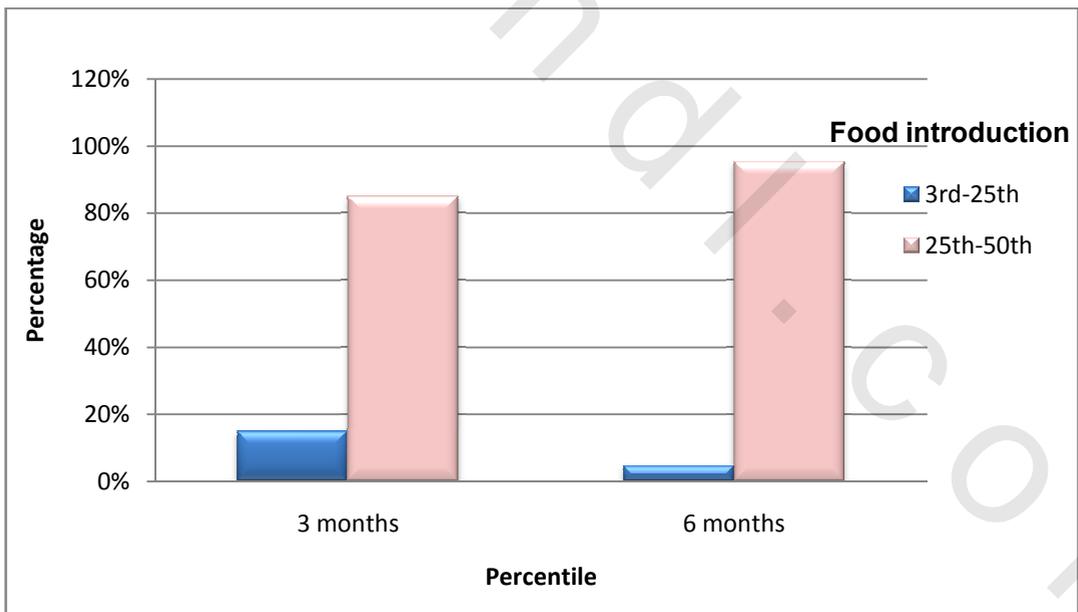**Figure (8): Relation between time of food introduction and time of standing alone in percentile.**

Figure (9): Relation between time of food introduction and time of walking alone in percentile.

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Table (XI) shows 80% of infants experienced optimal breast feeding could hold a pencil correctly compared to 31.6% experienced early feeding. The difference was statistically significant (P<.001).

Nearly all (90.5%) infants experienced optimal breast feeding could obey commands compared to 77.9% of infants experienced early feeding. The difference was statistically significant (P=.014).

Ninety three percent of infants experienced optimal breast feeding could eat independently compared to 71.6% of infants experienced early feeding. The difference was statistically significant (P<.001).

Table (XI): Comparison between 3 & 6 months age groups as regard fine motor development.

Fine motor development	Time of food introduction				χ^2	p
	3 months (n = 95)		6 months (n = 105)			
	No.	%	No.	%		
Transferring objects from one hand to another	95	100.0	105	100.0	-	-
Holding a pencil correctly	30	31.6	84	80.0	47.71*	<0.001*
Leaving objects when you ask him	74	77.9	95	90.5	6.028*	0.014*
Eating independently	68	71.60	98	93.30	16.728*	<0.001*

χ^2: Chi square test
*: Statistically significant at $p \leq 0.05$

Table (XII) shows almost all infants (99%) experienced optimal breast feeding could understand and respond to their mothers call compared to 74.7% of infants experienced early feeding. The difference was statistically significant (P<.001).

Also, playing simple games with anyone constituted 100% of infants experienced optimal breast feeding and 97.9% of infants experienced early feeding. The difference was not statistically significant (P=.224).

There was no statistical significant difference between the two studied groups in making some sounds (say mama, papa) where the majority of both groups could do. (91.4%, 84.2%).

The minority of infants (6.3%) experienced early feeding could speak one or two meaningful words while 33.3% of infants experienced optimal breast feeding could speak. The difference was statistically significant (P<.001).

Table (XII): Comparison between 3 & 6 months age groups as regard social & language development.

Social & Language development	Time of food introduction				χ^2	p
	3 months (n = 95)		6 months (n = 105)			
	No.	%	No.	%		
Understanding and responding to your call						
No	0	0.00	1	1.00		
Yes	71	74.70	104	99.00	36.308*	^{MC}p=<0.001*
Sometimes	24	25.30	0	0.00		
Playing with you or anyone						
No	2	2.10	0	0.00	2.233	^{FE}p= 0.224
Yes	93	97.90	105	100.00		
Making some sounds as (Papa& Mama)						
No	15	15.8	9	8.6	2.461	0.117
Yes	80	84.2	96	91.4		
Speaking one or two meaningful word						
No	89	93.7	70	66.7	22.33*	<0.001*
Yes	6	6.3	35	33.3		

χ^2: Chi square test
MC: Monte Carlo test
FE: Fisher Exact test
*: Statistically significant at $p \leq 0.05$

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Table (XIII) shows almost all (92.6%) infants experienced early feeding had chest infection compared to 89.5% of infants experienced optimal breast feeding. The difference was not statistically significant (P=.443).

The majority of both groups (94.7%, 92.4%) experienced gastroenteritis, with no statistical significant difference where P=0.550

Twenty one percent of infants experienced early feeding had skin allergy compared to 6.7% among those experienced optimal breast feeding. The difference was statistically significant (P=.003).

As regard respiratory tract allergy the majority of both groups (86.3%, 81%) had no allergy with no statistical significant difference (P=.308).

1.9% of optimal breast fed infants had GIT allergy in the form of constipation while 37.9% of early feeding infants had GIT allergy. Twenty five percent of them in the form of chronic diarrhea and 75% of them in the form of constipation. The difference was statistically significant (P<.001).

Also, being admitted to hospital constituted half of infants (50.5%) experienced early feeding, the main cause of admission was pneumonia (60.4%) compared to 6.7% among those experienced optimal breast feeding. The difference was statistically significant (P<.001).

Table (XIII):   Medical history of the studied infants.

Medical history	Time of food introduction				Test of sig.	p
	3 months (n = 95)		6 months (n = 105)			
	No.	%	No.	%		
Pneumonia& Bronchitis						
No	7	7.4	11	10.5	χ^2= 5.58	0.443
Yes	88	92.6	94	89.5		
Gastroenteritis						
No	5	5.3	8	7.6	χ^2= 0.455	0.550
Yes	90	94.7	97	92.4		
Skin allergy						
No	75	78.90	98	93.30	χ^2= 8.83[*]	0.003[*]
Yes	20	21.1	7	6.7		
Respiratory allergy						
No	82	86.3	85	81.0	χ^2= 1.04	0.308
Yes	13	13.7	20	19.0		
GIT allergy						
No	59	62.1	103	98.1	χ^2= 41.97[*]	<0.001[*]
Yes	**36**	**37.9**	**2**	**1.9**		
If yes n=38						
Chronic diarrhea	9	25.00	0	0.0	χ^2= 0.655	[FE]p=1.000
Constipation	27	75.00	2	100.0		
History of previous hospital admission						
No	47	49.50	98	93.30	χ^2= 48.12[*]	<0.001[*]
Yes	**48**	**50.50**	**7**	**6.70**		
Cause of admission n=55	**(n= 48)**		**(n= 7)**			
Pneumonia	29	60.40	7	100.00	χ^2= 3.654	[MC]p=0.143
Gastroenteritis	16	33.30	0	0.00		
Both	3	6.30	0	0.00		
Family history for allergy						
No	71	74.7	82	78.1	χ^2= 0.313	0.576
Yes	**24**	**25.3**	**23**	**21.9**		
If yes, What is its type?(n=47)	**(n= 24)**		**(n= 23)**			
Bronchial asthma	21	87.50	22	95.70	χ^2= 1.002	[FE]p=0.609
skin allergy	3	12.50	1	4.30		

χ^2: Chi square test

MC: Monte Carlo test

FE: Fisher Exact test

*: Statistically significant at $p \leq 0.05$

Table (XIV): Shows the mean number of respiratory tract infections that affect infants experienced optimal breast feeding was1.53±.94 in comparison with 2.82±1.10 number of attacks that affect infants experienced early weaning. There was statistical significant difference between both groups (P<0.001).

As regard gastroenteritis attacks there was statistical significant difference between the two groups as the mean number of gastroenteritis that affect infants experienced optimal breast feeding was 1.49±.75 in comparison with 2.63±.97 number of attacks that affect infants experienced early weaning (P<0.001).

There was no statistical significant difference between the two groups as regard number of attacks of skin and respiratory tract allergy.

Table (XIV): Number of attacks

Number of attacks	Time of food introduction		Test of sig.	p
	3 months	6 months		
Pneumonia& Bronchitis	**(n = 88)**	**(n = 94)**		
Min. – Max.	1.0 – 5.0	1.0 – 6.0	t= 8.474*	<0.001*
Mean ± SD.	2.82 ± 1.10	1.53 ± 0.94		
Median	3.0	1.0		
Gastroenteritis	**(n = 90)**	**(n = 97)**		
Min. – Max.	1.0 – 5.0	1.0 – 4.0	t= 8.952*	<0.001*
Mean ± SD.	2.63 ± 0.97	1.49 ± 0.75		
Median	3.0	1.0		
Skin allergy	**(n = 20)**	**(n = 7)**		
Min. – Max.	1.0 – 2.0	1.0 – 1.0	Z= 0.853	0.394
Mean ± SD.	1.10 ± 0.31	1.0 ± 0.0		
Median	1.0	1.0		
Respiratory allergy	**(n = 13)**	**(n = 20)**		
Min. – Max.	1.0 – 5.0	1.0 – 5.0	Z= 0.152	0.879
Mean ± SD.	1.85 ± 1.63	1.89 ± 1.59		
Median	1.0	1.0		

t: Student t-test

Z: Z for Mann Whitney test

*: Statistically significant at $p \leq 0.05$

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Table (XV): Shows the mean number of hospital admission among infants experienced early weaning was 1.25 ± 0.56 compared to 1.14 ± 0.38 number among those of optimal weaning. The difference was not statistically significant (P=0.0676).

Table (XV): Number of hospital admission

Hospital admission	Time of food introduction		Z	p
	3 months	6 months		
Number of admission	(n= 48)	(n= 7)		
Min. – Max.	1.0 – 4.0	1.0 – 2.0		
Mean ± SD.	1.25 ± 0.56	1.14 ± 0.38	0.418	0.676
Median	1.0	1.0		

*: Statistically significant at p ≤ 0.05

Table (XVI): Shows thirty percent of infants experienced early weaning with family history of skin allergy had skin allergy in comparison with no one of those experienced optimal weaning. The difference was statistically significant P= 0.004.

While there was no statistical significant difference between both groups with negative family history of skin allergy.

Table (XVI): Relation between family history and infants skin allergy and time of food introduction

Skin allergy	Time of food introduction				χ^2	p
	3 months (n = 95)		6 months (n = 105)			
	No.	%	No.	%		
Negative family history	(n = 71)		(n = 82)		2.448	0.118
No	59	83.1	75	91.5		
Yes	12	16.9	7	8.5		
Positive family history	(n = 24)		(n = 23)		9.239*	FEp = 0.004*
No	16	66.7	23	100.0		
Yes	8	33.3	0	0.0		

χ^2: Chi square test

FE: Fisher Exact test

*: Statistically significant at $p \leq 0.05$

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Table (XVII): Shows forty three percent of infants experienced optimal weaning with family history of respiratory tract allergy had chest allergy in comparison with 12.5% of those experienced early weaning. The difference was statistically significant (P= 0.018).

While there was no statistical significant difference between both groups with negative family history of respiratory tract allergy.

Table (XVII): Relation between family history and infants respiratory allergy and time of food introduction

Respiratory allergy	Time of food introduction				χ^2	p
	3 months (n = 95)		6 months (n = 105)			
	No.	%	No.	%		
Negative family history	(n = 71)		(n = 82)			
No	61	85.9	72	87.8	0.120	0.730
Yes	10	14.1	10	12.2		
Positive family history	(n = 24)		(n = 23)			
No	21	87.5	13	56.5	5.633*	0.018*
Yes	3	12.5	10	43.5		

χ^2: Chi square test
*: Statistically significant at p ≤ 0.05

Table (XVIII): Shows that there was statistical significant difference between infants experienced early weaning and infants experienced optimal weaning as regard GIT allergy either with family history of GIT allergy (P= 0.001) or with negative family history (P<0.001).

Table (XVIII): Relation between family history and infants GIT allergy and time of food introduction

GIT allergy	Time of food introduction				χ^2	p
	3 months (n = 95)		6 months (n = 105)			
	No.	%	No.	%		
Negative family history	(n = 71)		(n = 82)			
No	45	63.4	80	97.6	29.734^*	$<0.001^*$
Yes	26	36.6	2	2.4		
Positive family history	(n = 24)		(n = 23)			
No	14	58.3	23	100.0	12.173^*	$^{FE}p= 0.001^*$
Yes	10	41.7	0	0.0		

χ^2: Chi square test

FE: Fisher Exact test

*: Statistically significant at $p \leq 0.05$

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Table (XIX) shows anthropometric measurements (in percentile) among studied infants.

The mean weight of infants experienced early feeding (8.95±0.62 kgm) was less than the mean weight of those infants experienced optimal breast feeding (9.54±0.71kgm). 43.2% of infants experienced early weaning their weight was in (25th-50th, 50th-75th percentile) compared to 80% of infants experienced optimal breast feeding. The difference was statistically significant (P<.001).

The mean length of infants experienced early feeding (73.17±1.92cm) was less than the mean length of those infants experienced optimal breast feeding (75.01±1.45cm). Thirty eight percent of infants of first group their length was in normal percentile (25th-50th, 50th-75th) compared to 85.7% of infants experienced optimal breast feeding. The difference was statistically significant (P=.001).

The mean head circumference of infants experienced early feeding (45.13±1.14cm) was less than the mean head circumference of those infants experienced optimal breast feeding (45.54±2.84cm). Twenty four percent of infants of first group their head circumference was in normal percentile (25th-50th) compared to 62.9% of infants of second group. The difference was statistically significant (P=.001).

Table (XIX): Comparison between 3 & 6 months age groups as regard anthropometric measurements (in percentile).

Anthropometric measurements (in percentile)	Time of food introduction				Test of sig.	p
	3 months (n = 95)		6 months (n = 105)			
	No.	%	No.	%		
Weight						
3rd-25th	53	55.8	15	14.3		
25th-50th	17	17.9	40	38.1		
50th-75th	24	25.3	44	41.9	χ^2= 35.79[*]	<0.001[*]
75Th-97th	1	1.1	4	3.8		
>97th	0	0.0	2	1.9		
Min. – Max.	8.0 – 10.0		8.0 – 13.50			
Mean ± SD.	8.95 ± 0.62		9.54 ± 0.71			
Length						
3rd-25th	59	62.1	14	13.3		
25th-50th	25	26.3	55	52.4	χ^2= 52.14[*]	<0.001[*]
50th-75th	11	11.6	35	33.3		
75Th-97th	0	0.0	1	1.0		
Min. – Max.	66.0 – 77.0		70.0 – 77.0			
Mean ± SD.	73.17 ± 1.93		75.01 ± 1.45			
Head circumference						
3rd-25th	51	53.7	18	17.1		
25th-50th	23	24.2	66	62.9	χ^2= 42.19[*]	<0.001[*]
50th-75th	12	12.6	19	18.1		
75Th-97th	9	9.5	2	1.9		
Min. – Max.	44.0 – 47.0		43.0 – 48.0			
Mean ± SD.	45.13 ± 1.14		45.54 ± 0.84			

χ^2: Chi square test

MC: Monte Carlo test

FE: Fisher Exact test

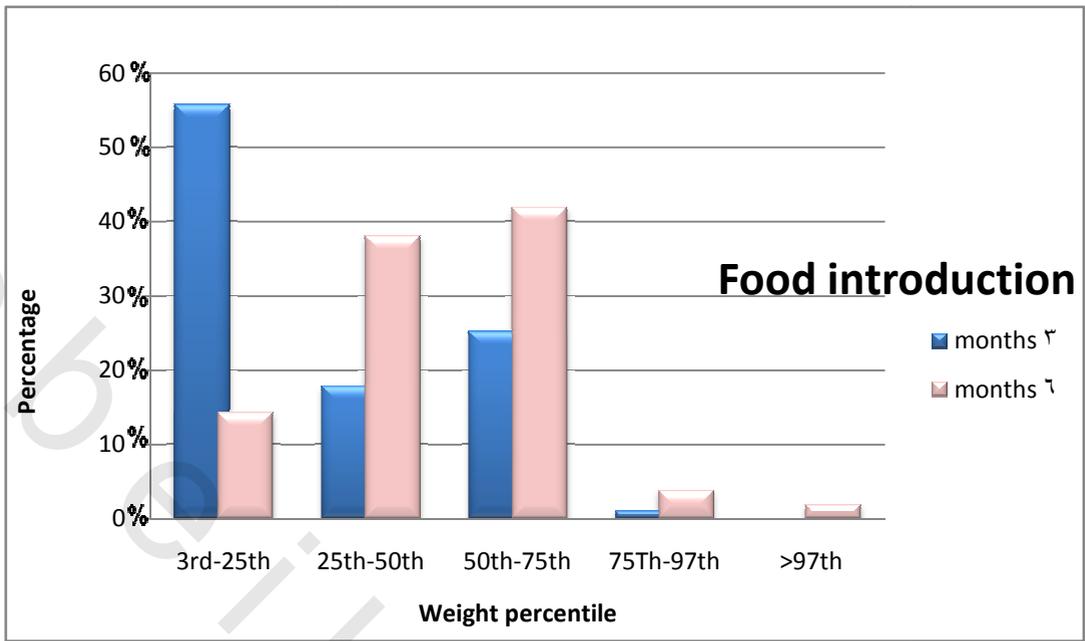*: Statistically significant at $p \leq 0.05$

Figure (10): Shows the relation between time of food introduction and infant's weight in percentile.
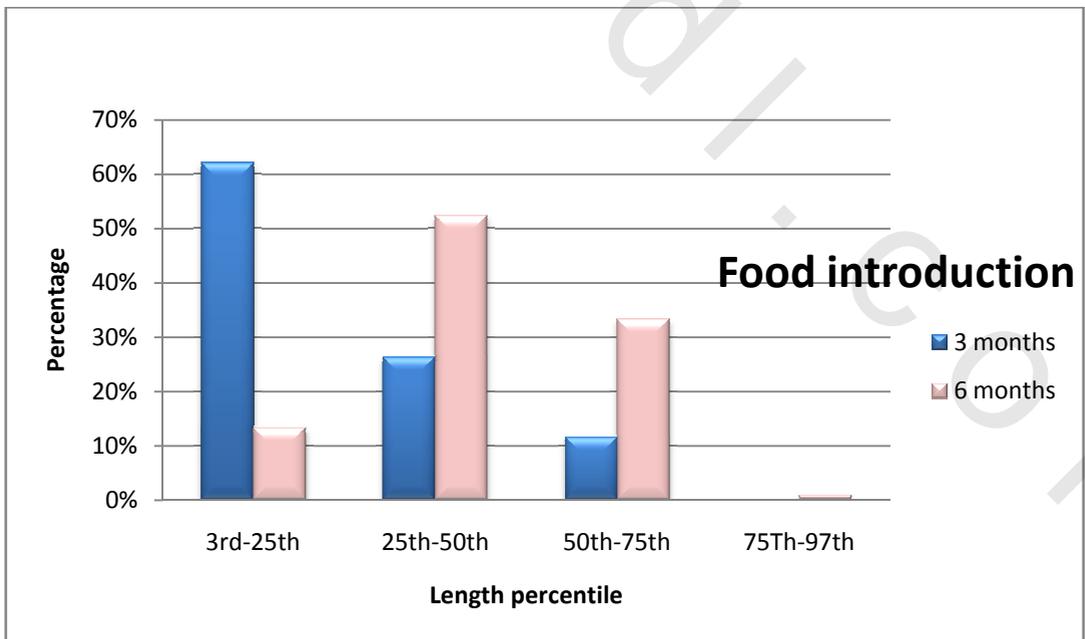

Figure (11): Shows the relation between time of food introduction and infant's length in percentile.
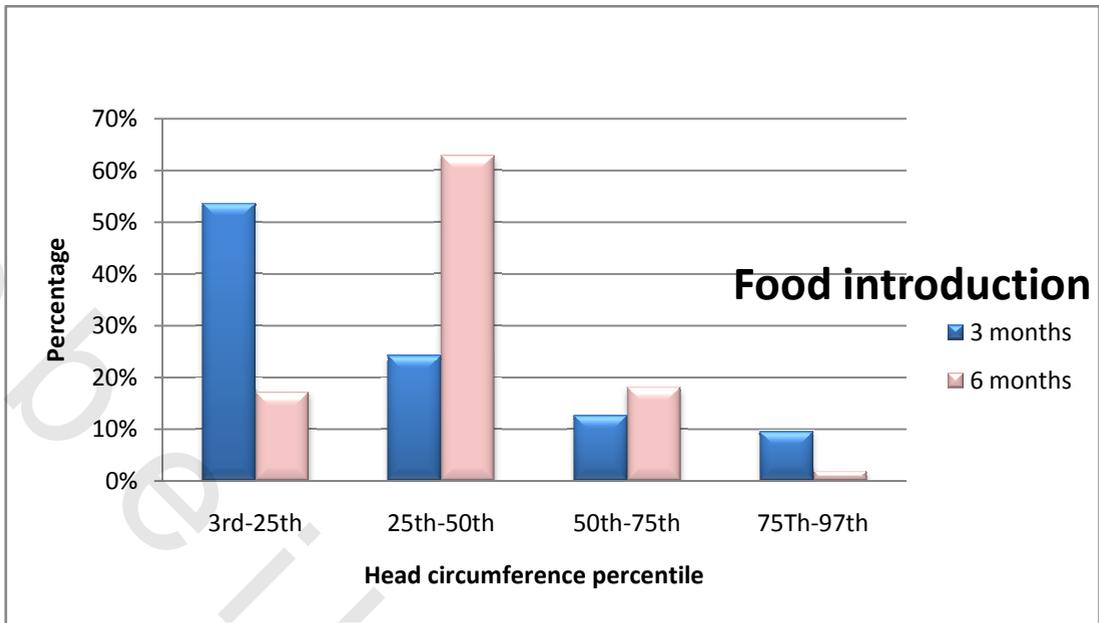
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Figure (12): Shows the relation between time of food introduction and infant's head circumference in percentile.