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EVALUATION OF NUTRITIONAL STATUS OF INFANTS IN WEANING AGE

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ABSTRACT: A cross sectional study of the infants seen in rural and urban areas in Sharkia Governorate was carried out. Results on growth and nutrient intake in infants in the second year of infancy fed human milk or formula addition to complementary feeding and weaned infants have been studied in this community. 100 infants aged 12-24 months were studied comparing their nutrient intake and growth in both areas, their anthropometric measurements and distribution of the Z-score of weight for age, length for age, and weight for length were assessed in relation to the NCHS reference population growth tables.

In the overall population, 11.1%were found to be under weight (Z-score <-2SD) in rural areas at age19-24 months, 12.1% were stunted (Z-score length foe age <-2SD) in urban areas at age 12-18 months and 11.1%wasted (Z-score of weight for length <-2SD) in rural areas at age 19-14 months. There was very high significant difference between socio-economic class and anthropometric measurements in rural and urban areas ($p<0.001$). The majority of infant in rural and urban areas were breastfed and taken a complementary feeding (86.5% and 87.1%) respectively. For bottle-fed infants the percentage nearly equal (13.5% and 12.9%) in rural and urban areas respectively. While the percentage of weaned infants (26% and 38%) in rural and urban respectively, hence it is indicates that, there was high significant difference between feeding type and residence.

There was significant association at $p<0.05$ between socioeconomic class and zinc and vitamin C intake in rural areas, while there was a

positive correlation between socioeconomic level and each intake of total calories, total iron, zinc, vitamin B1 and vitamin B2. in urban areas. There was significant association in urban areas at $p<0.05$ between maternal knowledge level and vitamin C for rural and urban areas.

Keywords: Infants nutritional status, maternal knowledge, weaning.

INTRODUCTION

The nutrition of children has importance that it is one of the key elements of the child's right to health as defined in the Convention on the Rights of the Child.

Schoch *et al.* (1991) mentioned that mother's milk provide nutrients for optimal development of infants up to 4-6 months, there after digestion and immunity system of infants are developed and enable the infants during this age to digest different variety of foods.

Goldberg *et al.* (1995) studied Timing of introduction of solid food and liquids, other than breast milk or formula to infants in Hawaii, USA, were examined and compared to current infant feeding recommendations. 2011 respondents (mothers of infants aged 14-16 month) completed Hawaii infant feeding study questionnaires examining infant feeding practices and mothers attitudes, significant ethnic differences were found in the percentage of women who followed recommended infant feeding guidelines.

Davies *et al.* (1997) studied the effect of early complementary feeding on nutritional status of infants in Nigeria was studied by 82 infants 3 to 4 months old. The group who started complementary feeding early before 2 months thus, poorer nutritional status was significantly associated with earlier complementary feeding and weight for age were lower also, promotion of weaning education should be vigorously promoted in these rural communities.

Michaelsen and Friis, (1998) stated that under nutrition associate with use of nutritionally in adequate weaning food in developing countries is discussed and strategies to improve the quality of infant food are examined. Aspect considered include, high prevalence of under nutrition in infant in developing countries, changes in diet and growth associated with weaning

particularly in infants aged 6-18 months optimal age for introduction of weaning food .Use of cereal-based porridges as weaning foods. To improve nutritional quality of weaning food (addition of vitamin C rich food and meat to enhance absorption of minerals from cereal-based weaning food and enrichment of energy and nutrients in cereal-based porridges by addition of fat, fish, milk, vegetables, fruit or micronutrient mix.

Sanni *et al.* (1999) In many developing countries, especially in tropical Africa, infant weaning foods as well as foods for adults are based on local staple diet made from cereals, roots and tubers of cassava and potatoes. Those foods are usually prepared as thick porridges for adults or as liquid gruels for infants. To be suitable for the feeding of young children, these cereals are prepared in liquid form by dilution with a large quantity of water, thereby resulting in more volume but with a low energy and nutrient density.

Abidoye *et al.* (2000) stated that, weaning too late can leads to faltering growth, decrease immune protection, and again increased diarrhea disease and malnutrition when exclusively breastfeeding becomes inadequate. Inappropriate choice of weaning foods can lead to protein energy malnutrition and an array of micronutrient deficiencies.

AAP, (2001) encouraged the promotion and advocacy of activities that support longer duration of successful breastfeeding in order to optimize the nutritional, immunological, psychological, and economic benefits.

Simondon *et al.* (2001) stated that prolonged breastfeeding is frequently associated with malnutrition in less-developed countries even after adjustment for socioeconomic confounders.

Inappropriate feeding practices are a major cause of the onset of malnutrition in young children. Children who are not breastfed appropriately have repeated infections, grow less well, and are almost six times more likely to die by the age of one month than children who receive at least some breast milk. From six months onwards, when breast milk alone is no longer sufficient to meet all nutritional requirements, infants enter a particularly vulnerable period of complementary feeding during which they make a gradual transition to eating family foods. The incidence of malnutrition rises

sharply during the period from 6 to 18 months of age in most countries, and the deficits acquired at this age are difficult to compensate for later in childhood, (WHO, 2002a).

Kramer and Kakuma, (2002) concluded that exclusive breastfeeding for six months confers several benefits on the infant and the mother. Chief among these is the protective effect against infant gastrointestinal infections, which is observed not only in developing country settings but also in industrialized countries.

AAP, (2002), recommends that breast milk is the recommended source of nutrition for almost all infants and it should be continue. As possible beyond the first year as it offer considerable benefits to both.

One of the most important causes of malnutrition in children appeared to be mother's lack of knowledge and information about healthy nutrition. Most of them depend on giving to an understanding mother, adequate initial guidance and acceptable supply of supplementary feeding should compensate for the inadequate nutrients in milk. Hence, milk alone is not enough for children after the first few months of life and supplementary feeding becomes necessary to start at that period of infancy and consequently some sort of food supplementation should be bought by mother, the family, the nutrition agencies or even the concerned ministries and association of the government, (UNICEIF, 2003).

Davies and O'Harea, (2004) stated that, the scientific basis of weaning is the requirement for food energy, protein, fats, major minerals, iron, vitamins and other micronutrients to satisfy normal growth development and optimize health, on the other hand, Feed a variety of foods to ensure that nutrient needs are met. Meat, poultry, fish or eggs should be eaten daily, or as often as possible. Vegetarian diets cannot meet nutrient needs at this age unless nutrient supplements or fortified products are used. Vitamin A-rich fruits and vegetables should be eaten daily. Provide diets with adequate fat content. Avoid giving drinks with low nutrient value, such as tea, coffee and sugary drinks such as soda. Limit the amount of juice offered so as to avoid displacing more nutrient rich foods. Infant feeding is the dominant nutritional interest in third world countries and it gets

much attention in western countries because infants depend on others to feed them. For their first few months babies are fed only one food, so its composition is much more critical than the composition of the many different foods in a mixed diet. Babies cannot eat ordinary adults food or say how they feel after the feed. Though there are still many questions, scientific knowledge is probably fuller about nutrition for this age of man than any other. (Devaney, *et al.*, 2005).

MATERIALS AND METHODS

This is a descriptive study designed more specifically cross sectional in nature. The study was carried out in Sharkia governorate on 2006-2007.

Target Groups

The target groups consisted and selected randomly, the monitored population consisted of mothers and their infants. The sample under study were involved 100 infants (50 from urban and 50 from rural) aged from 12 to 24 months. The urban samples were taken from Zagazig and Menia El-Kamh cities wile the rural samples were taken from rural area followed to the both cities.

Study Design

The medical offices and centers followed to Ministry of Health and Population in Sharkia Governorate gave consent for data collection from its' customs. Simple random sampling method was employed to select the urban samples so, 4 health centers, three of them in Zagazig City and the other one in Menia El-Kamh City. For Rural samples, it were selected randomly from Village Health Center. After that the selected samples were followed-up by house visits and/or telephone communication. All mothers and infants in the specified age group were eligible for the study in the Health Centers and house visits. All mothers and infants were interviewed and/or questionnaired.

Tools of Study

The data were collected through personal interviews with the infants' mothers to file the specially designed questionnaire sheets. Questionnaire sheet included the following items:

Socio-economic characteristics of the infant's family

Data related to the parents, family features, and housing

conditions, after modification of Fahmy and El-Sherbini (1983) scoring system for socioeconomic level was used, the total score for questions is (26) degree. score equal or more than 75% would be considered as a high socio-economic class, 50% to < 75% would be considered as middle socio-economic class, and < 50% would be considered as low socio-economic class.

Pattern of feeding

Data related to type of feeding, quantity, frequency and duration of breastfeeding were recorded for each sample, as well complementary feeding was monitored form starting time, reasons of introducing it, and types of complementary foods.

Mother's awareness about infant feeding and weaning

Mothers were interviewed and assessed for their knowledge and awareness about infant feeding and weaning practices. Scoring system for knowledge questions was done; each item in the tool was scored as follows: (1) with the right answer, (0) wrong answer scored

Total score of these item was 20 degree. Score of knowledge for mothers about infant care was as follows: score equal or more than 75% would be considered as a high knowledge, 50% to < 75% would be considered as middle knowledge, and < 50% would be considered as low knowledge.

Anthropometric Measurements

The anthropometric measurements carried out included weight, length and head circumference. Anthropometric measurements were as follows:

Weight

The pediatric scale was used to determine the weight to the nearest 10 gm. The infants were weighed with very light under wear which was weighted and subtracted before recording the weight. the scale was checked at (0) to be sure that it was balanced. the toddler was being placed in a panty like belt, then hooked up to the balance and the reading was recorded.

Length

The method used to obtain the supine length was that described by Jelliffe, (1989). Supine length was taken for all the infants. The crown-heel linear measurements were taken with child lying on a hard surface. With the toes pointing upwards, two marks were made: one at the cranial region (the

highest on the vertex) and the other at the plantar surface of the feet where the heel touches the table. The marking pen was held at right angle to the plain of the table. The reading was taken to the nearest millimeter with the tape rule.

The data was compared with NCHS and WHO references tables, these included (weight-for-age, length-for-age and weight-for-length). The methods of standard deviation score was adapted using the cut-off points (z-score) according (WHO/NCHS, 1995).

Dietary Intake

The dietary intake was carried to asses the daily nutrients intakes for each infant using 24 hr recall to compare the nutritional value of the food consumed with the child recommended dietary allowances "RDA" (WHO, 1989).

The Mean of Food Intake "24 Hours Recall "for 4 Days

The mother was asked to report the food items and mixed dishes consumed by infants day by day for 4 days, The mothers were given a pre-measured dish and gradated cup then asked to report the food items and mixed dishes consumed by infant, information were requested for eating events in sequence beginning with first eating event of the day. Specifying each event whether major or minor and recording food items in each event. The mean Intake of each food item/24 h was computed in grams and analyzed by using the computer food analysis programs Version I, 1995. For total calories and selected macro and micro nutrients then it referenced and compared with the recommended dietary allow (RDA) according to WHO, (1989).

Data Statistical Management

The collected data were coded and entered in a data base file, then after completed data entry, the data were transferred to the SPSS Version 9.0 program. Then the program outputs were tabulated in frequency and percentage. The tests of significance used were: ANOVA, CHI-Square, LSD and correlation.

RESULTS AND DISCUSSION

Type of Infants Feeding

As shown in Table 1 there was insignificant difference between sample in type of feeding. The majority of infant in urban were breastfeeding and taken a complementary feeding (87.1%)

while in rural area were (86.5%). Concerning bottle feeding infants were in rural an urban (13.5% and 12.9%) respectively. Concerning weaned infants the majority percentage were (38%) in urban while the minority percentage was (26%) in rural areas.

Timing of Introducing Complementary Feeding

In the same, there was a highly significant difference between timing of introducing the complementary feeding and residence the first category in the age < 4 months. Majority of infants in rural were given complementary feeding (40%) while (22%) in urban area. The second category in the age 4-6 months. majority of infants were given complementary feeding (C.F) in urban (54%) minority were in rural areas (36%). Regarding for age > 6 months, the percentage were equal (24%) in rural and urban area .This result were in harmony with (Sabah 2006) who found nearly 37.0% of mothers giving their infants first food at the age of 4 to 6 months and weaned their infants from breast at the same age.

This finding was in agreement with Bloomquist, H. K. *et al*, (2003) who suggested that the proper age for weaning the infant is that when the infant's 4 to 6 months of age, this could be attributed to such age most infant gradually reduce the volume and frequency of their demand for breastfeeding and the iron stores in the milk supply is high bioavailability for proper growth and development, also introducing of solid food and supplementary are advised to meet all nutrient need, of the breast fed or bottle fed infants beyond age of 6 months.

Table 1. Distribution of infant's type of feeding and timing of introducing complementary feeding

Items	Rural		Urban		X^2	*P*
	No.	%	No.	%		
Type of feeding:						
• Breastfeeding + C.F	32	86.5	27	87.1	1.654	0.198
• Bottle-feeding + C.F	5	13.5	4	12.9		
• Weaned	13	26.0	19	38.0		
Timing Introduce C.F						
• < 4 months	20	40.0	11	22.0	25.113	0.000 ***
• 4-6 months	18	36.0	27	54.0		
• > 6 months	12	24.0	12	24.0		

*** Very High significant at p< 0.001

Distribution of Socioeconomic Class for Monitored Population

Socioeconomic classification for monitored population in both area were given in Table 2 and Fig. 1 regarding socio economic class (58%) had a high socioeconomic class in urban area while in rural 8% only had a high socioeconomic class concerning moderate socio economic class it was found the percentage (76.0% and 36.0%) respectively in rural and urban. The minority were (16% and 6%) in low socio economic class respectively.

Table 2. Distribution of socioeconomic class for Monitored Population

Socio-economic class	Rural		Urban		Total		X^2	P
	No.	%	No.	%	No.	%		
Low	8	16.0	3	6.0	11	11.0		
Moderate	38	76.0	18	36.0	56	56.0	28.355	0.000***
High	4	8.0	29	58.0	33	33.0		
Total	**50**	**100**	**50**	**100**	**100**	**100**		

**** Very high significant at p< 0.001

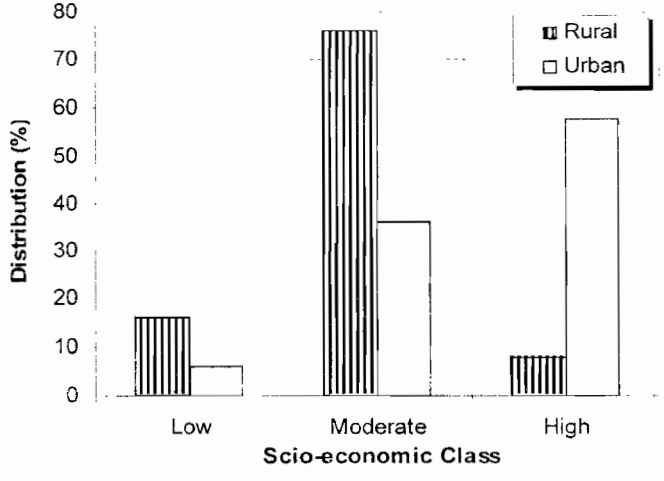

Fig. 1. Distribution of socioeconomic class in rural and urban areas

Distribution of Adequacy of Mother's Knowledge Level

The distribution of adequacy of mother's knowledge level in rural and urban areas is shown in Table 3 and Fig. 2. Concerning mother's knowledge level, 54% for rural and 74% for urban areas, had a moderate level of knowledge, and 36% for rural and 10% for urban had low level of knowledge, while the rest belonged to high level of knowledge (10% and 16%) respectivcly in rural and urban areas. The results are statistically high significant. So maternal' s nutritional knowledge is a factor of malnutrition. Therefore, there is always the need for counseling and nutrition education of the mothers especially in developing countries of the world.

Table 3. Distribution of mother's knowledge level in rural and urban areas

Knowledge level	Rural		Urban		Total		X^2	P
	No.	%	No.	%	No.	%		
Low	18	36.0	5	10.0	23	23.0	9.603	0.008**
Moderate	27	54.0	37	74.0	64	64.0		
High	5	10.0	8	16.0	13	13.0		
Total	**50**	**100**	**50**	**100**	**100**	**100**		

** Significant at p<0.01

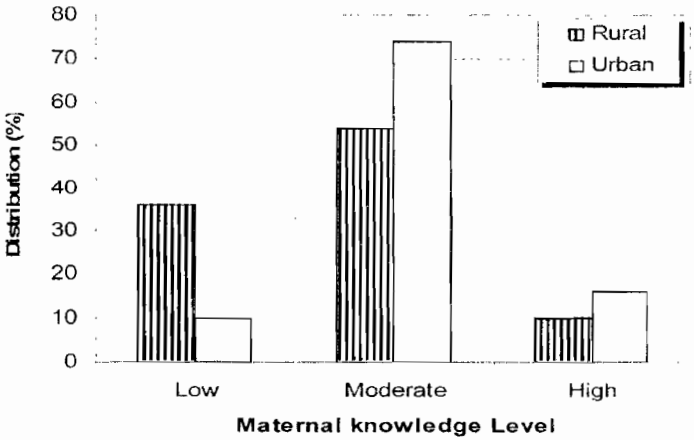

Fig. 2. Distribution of mother's knowledge level in rural and urban areas

Anthropometric Measurements

Weight-for-age(W/A) Z-score

The distribution of weight for age (W/A) z-score according to infants age and residence showed in Table 4. The prevalence of under weight (<-2S.D.) was high among the infants at both group 12-18 and19-24 months (9.4% and 11.1%) respectively, in rural areas. Most of sample in normal weight (median ±2 S.D.) in both areas while the highest percentage were in urban areas (93.9%and 100.0%)respectively for both group, on the other hand, the over weight (>+2S.D.) was at group 12-18 months in urban areas 3.0%, finally there wasn't significant difference between them in weight-for-age z score. The results obtained were harmony with those reported by Amany (2000), who found that infants at age group 12-<18 months. The prevalence of under weight (<-2S.D.) was2.4%, while the normal weight was high in both group age 12-<18 and 19-24 months (95.2% and100.0%) respectively. The results obtained were agreed with those reported by Sayed *et al.* (1988) showed that, the proportion of under nutrition as indicated by weight for age was 13%.The proportion of children falling this category was greater among children 12-23 months especially in rural areas for upper Egypt. The results were agreed with Insel *et al.* (2002) showed the infant weights of both rural and urban areas were within the average infant's weights recommended by international organization. Abdel Monem (1992) reported that the under nutrition increased with increased age.

Length-for-age (L/A) Z-score

The distribution of length- for-age (L/A) z-score according to infants age and residence showed in Table 5. The prevalence of under length (<-2S.D.) cleared at age group 12-18 months in rural and urban areas (9.4% and 12.1) respectively, most of sample had a normal length (median ±2S.D) in both areas while the highest percentage were at age 19-24 months in rural and urban areas (94.7% and 100.0%) respectively. All groups hadn't over stunting (>+2S.D) in both area, finally there wasn't significant difference between them in length-for-age z score. The obtained results were agreed and disagreed in some things which reported by Amany (2000), who found that, the lowest percentage of stunting (L/A <-2 S.D) is in the age group 12 -< 18 months (2.4%) while the highest

percentage of normal length is in 19-24 months (100%) and the highest proportion of tallness is in 12 -< 18 months (19%).

Weight-for-length(W/L) Z-score

The distribution of weight-for-length Z-score according to infants age and areas pattern were shown in Table 6. The results showed that, the highest percentage of wasting (<-2S.D) were in rural areas at both age groups (6.3% and 11.1%) respectively while the lowest percentage was (3%) in urban areas at age (12-18) months. The majority of the samples were within normal range (median ± 2 S.D) in both areas while the highest percentage of normal (100%) in urban area at age (19-24) months. The percentage of over weight-for-length (> +2 S.D) was nearly equal in rural and urban at the same age (12-18) months (3.1% and 3%) respectively. Finally there wasn't significant difference between infants in weight-for-length Z-score for all age groups in rural and urban areas.

The results obtained were similar with that obtained by Amany (2000) who found that, the age groups 12 -<18 months and 19-24 months had the highest percentage of normal (M ± 2 S.D) was found in age group 19-24 months (19.6%).

These results agreed with the results which reported by Moussa (1988). The results showed sever and moderate degree of a cut under nutrition (4.6% and 3%) respectively, while the normal Wt/Ht was (79.5%) in a study of preschoolers.

Table 4. Distribution of Weight-for-Age Z-score according to infants age

Z-score	Rural				Urban				Total		X^2	*P*
	12-18		19-24		12-18		19-24					
	No.	%	No.	%	No.	%	No.	%	No.	%		
< -2 SD	3	9.4	2	11.1	1	3.0	-	-	6	6.0		
Median±2 SD	29	90.6	16	88.9	31	93.9	17	100	93.	93.0	5.071	0.535
> + 2 SD	-	-	-	-	1	3.0	-	-	1	1.0		
Total	32	100	18	100	33	100	17	100	100	100		

Table 5. Distribution of Length-for-Age Z-score according to infants age

Z-score	Rural				Urban				Total		X^2	P
	12-18		19-24		12-18		19-24					
	No.	%	No.	%	No.	%	No.	%	No.	%		
< -2 SD	3	9.4	1	5.6	4	12.1	-	-	8	8.0		
Median±2 SD	29	90.6	17	94.7	29	87.9	17	100	92	92.0	2.468	0.481
> + 2 SD	-	-	-	-	-	-	-	-	-	-		
Total	32	100	18	100	33	100	17	100	100	100		

Table 6. Distribution of Weight-for-Length Z-score according to infants age

Z-score	Rural				Urban				Total		X^2	P
	12-18		19-24		12-18		19-24					
	No.	%	No.	%	No.	%	No.	%	No.	%		
< -2 SD	2	6.3	2	11.1	1	3.0	-	-	5	5.0		
Median±2 SD	29	90.6	16	88.9	31	93.9	17	100	93	93.0	3.773	0.707
> + 2 SD	1	3.1	-	-	1	3.0	-	-	2	2.0		
Total	32	100	18	100	33	100	17	100	100	100		

The Mean of Dietary Intake as Percentage of Recommended Dietary Allowance (RDA)

Energy intake

Data presented in Table 7 showed the percentage of nutrients of the children from heir RDA. For infants aged (12-18) months the highest percentage for calories in take from RDA was in urban areas was (72.65±8.02%) and the lowest percentage was in rural areas (65.61±10.12%), there was a high significant difference between them while the infants at the age (19-24) months the highest percentage for calories intake from RDA was in urban (75.56±1.82%) while the lowest percentage was (69.11±11.69%) in rural areas there wasn't significant differences between them.

The obtained results in Table 7 was similar with those reported by Soheir, (2007) the intakes of calories for infants at the age (12-18) months were covered only 78.2% of the RDA. In another study by Nasr, (1994) the mean energy intake was 716 kcal, with percent of RDA (76.1%), and they recorded that (56.6%) of children and their families do not satisfy R.D.A. for energy. This shows that energy inadequacy is even more serious problem. Comparable variation, recorded in this study are similar to the results reported by Galal, (1985) who indicated that cereals were the major source of calories and protein in the Egyptian diet.

Protein intake

For the infants at the age (12-18) months the highest percentage of protein intake from RDA were (113.47±32.96%) in urban areas, the lowest percentage were in rural areas (99.73±23.69%). While the infants at the age (19-24) month the mean percentage from RDA were (101.06±21.86% and 113.74 ± 49.88%) in rural and urban and urban areas respectively and there wasn't a significant difference between all group. The total amount of protein was higher than 100% of recommended daily allowance expect the infants at the 12-18 months in rural areas was less than the recommended daily allowance.

These results were in harmony with those obtained by Sayed *et al.* (1988) noticed that the data of 24 hour dietary recall of food intakes of pre-school children showed that such children got intakes above the RDA of protein. However, they got significant lower intakes of

calories when compared with the RDA. These results are contrast with Sohier, (2007) the infants at age (12-18) months mean protein intakes were lower than the recommended allowances (80%), most of the protein source was breast milk, which is generally accepted as a good protein source. Consequently, they concluded that the younger infants were receiving insufficient protein intakes.

Minerals intake

Calcium

For infants at the age (12-18) months in rural and urban were (34.32±14.42% and 47.33±12.48%) respectively, its were less than half of the percentage of RDA and there were a Very high significant difference between them. While the infants at the age (19-24) months the percentage from RDA. were (33.28±10.32% and 44.23±17.47%) respectively in rural and urban and there was a significant difference between them. Similar results were obtained by Creed *et al.*, (1990) who found that the calcium densities of the diet increased after the first part of the year as breast milk was replaced by cow milk, while it decreased towards the end of the year with the introduction of non milk foods.

The obtained results were agree with those reported by Gihan (2001) and Sohier (2007) who revealed that the mean intake of calcium was not satisfactory as it covered only (65.28±28.95% and 72.6%) respectively of the RDA.

Total iron

The mean intakes of iron were less than one half of their needs from the recommended allowances. The infants at the age (12-18) months in rural and urban areas were (28.67±13.59 and 34.07±14.27%) respectively and the was not significant difference between them while the infants at the age (19-24) months were (35.56±11.96 and 48.59 ± 16.96%) respectively in rural and urban only and there was a high significant difference between them. The obtained results in Table 7 were in harmony with hose reported by Soheir (2007) the infants at age 12-18 months the intakes of iron less than one half of their needs. This results also agreement with the results of Ibrahim (1998) who found that the studied children got intake of iron less than one half of their need, being 97.6% of the RDA.

Zinc

The results in Table 7 indicate that the percentage intake of zinc were less than half of the recommended allowances in all group in both areas while the urban areas had a slight high of zinc from RDA. than the rural areas. The infants at the age (12-18) month had (24.45±4.67% and 29.41±7.76%) respectively in rural and urban while the infants at the age (19-24) months had (23.72 ± 5.16% and 29.82 ± 8.57%) respectively in rural and urban of RDA from zinc and there was high significant difference between all group.

Similar result were obtained by Sohier (2007) that they found that the mean intakes of zinc were less than half of the recommended allowances representing 23 and 23% of the RDA at the age 12-18 months. These results were in harmony with those obtained by Ibrahim (1998) who found the mean intakes of zinc were less than half of the recommended allowances representing 49.2, 39.7 and 37.1% of the RDA in group respectively.

The vitamins intake

Vitamin C

The intakes of vitamin C were less than RDA, which were 89.37±25.36% and 97.93±35.91%) respectively as shown in Table (8) in rural and urban at the age (12-18) months and there was not significant difference between them while the infants at the age (19-24) months, the percentage intakes of vitamin C were more than RDA which were (145.99± 31.73% and 161.7±36.6%) respectively in rural and urban areas and there was not significant difference between them. The similar results were obtained by Gihan (2001) who found that the study subject in all groups were consuming more than RDA of Vitamin C (138.85 ± 84.31%, 326.59 ± 708.27%, 133.83 ± 171.89% and 111.25 ± 93.94%) respectively and this results disagreement with the infants at the age group (12-18) months.

Similar results were obtained by Sohaier (2007) and agreement with the infants at the age (12-18) months which the intakes of vitamin C was less than RDA, which were 81.5 from the RDA at the age of 12-18 months. These results were in harmony with those obtained by Creed *et al.* (1990) who found that ascorbic acid were less than those recommended by the us food and nutrition.

Vitamin A

The infants at the age (12-18) month the lowest percentage of

vitamin A from RDA were (85.41±22.19) in rural while the highest percentage were (104.82 ± 44.04%) in urban and there was a significant difference between them while the infants at the age (19-24) months the intakes of vitamin A from RDA were less then RDA (72.55±35.61% and 82.34±38.45%) respectively in rural and urban areas and there was not significant difference between them this may be reflect to the low intake of dietary sources of this results disagreement with Betty *et al.*, (1997). The high intake values for vitamin A reflect the dietary sources of strained vegetables and fronts. The obtained results in Table (18) were in harmony with those reported by Gihan (2001) who found that the intake of vitamin A from RDA were (78.10±58.61%, 93.68±75.45%, 66.10 ± 117.09% and 103.72± 86.21%) respectively for all study subject groups.

The obtained results were not agree with reported by Sohier (2007) who found that infants at age 12-18 months had more than the percent of vitamin A of RDA.

Vitamin B1

The infants at the age (12-18) months the mean intakes of thiamin from RDA were (34.23±9.96% and 41.42±13.91%) respectively in rural and urban areas and there was a significant difference between them it was observed that less than the half of RDA. While the infants at the age (19-24) months the mean intakes of thiamin from RDA were (37.29 ± 10.03% and 53.34± 17.72%) respectively in rural and urban it was observed that less than the RDA. This may be reflect to the decreasing consuming whole grain, bread comprised by the majority of consuming rice, macarrony which it was poor of thiamin.

This results were in harmony with those reported by Creed *et al.*, (1990), Gihan (2001) and Sohier (2007) who found that thiamin were less than those recommended by thus food and nutrition.

Vitamin B2

The infants at the age (13-8) months the percentage intakes of vitamin B2 from RDA were (57.48 ± 26.54% and 69.22 ± 23.57%) respectively in rural and urban areas and there was a significant difference between them while the infants at the age (19-24) month the percentage intakes of vitamin B2 from RDA were (66.77±28.45 and 82.76± 24.76%) respectively

in rural and urban areas and there was not significant difference between them it was observed that the riboflavin intakes were less than the recommended allowances that may be reflect to the low content of milk in the diets of these infants this results were disagreement with those obtained by Sohier (2007) who found that the percentage intakes of vitamin B2 were (200%) from RDA. Riboflavin intakes were more than adequate because of the high content of milk in the diets of these infants. Betty *et al.* (1997) who reported that the high intakes of riboflavin is associated with ingestion of infant cereals.

Table 7. Means and SD of dietary intake of calories, total protein and minerals as % of RDA as a comparison between rural and urban populations

Nutrients	Rural 12-18 No. = 32	Urban 12-18 No. = 33	Rural 19-24 No. = 18	Urban 19-24 No. = 17	Total P	P_1	P_2
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD			
Calories (%)	65.61±10.12	72.65±8.02	69.11±11.69	75.56±10.82	0.004**	0.005**	0.05*
Total Protein (%)	99.73±23.69	113.47±32.96	101.06±21.86	113.74±49.88	0.238	0.09	0.248
			Minerals				
Calcium (%)	34.32±14.42	47.33±12.48	33.28±10.32	44.23±17.47	0.000***	0.000***	0.031*
Total Irion (%)	28.67±13.59	34.07±14.27	35.56±11.96	48.59±16.96	0.000***	0.128	0.008**
Zinc (%)	24.45±4.67	29.41±7.76	23.72±5.16	29.82±8.57	0.002**	0.003**	0.008**

* significant at $p<0.05$ ** high significant at $p<0.01$

*** very high significant at $p<0.001$

P: p-value between all groups P1: p-value between groups age 12-18 months

P2: p-value between groups age 19-24 months

Table 8. Means SD of dietary intake of vitamins as % of RDA as a comparison between rural and urban populations

Nutrients	Rural 12-18 No. = 32	Urban 12-18 No. = 33	Rural 19-24 No. = 18	Urban 19-24 No. = 17	Total P	P_1	P_2
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD			
			Vitamins				
V_C (%)	89.37±25.36	97.93±35.41	145.99±31.73	161.7±36.6	0.000***	0.739	0.140
V_A (%)	85.41±22.19	104.82±44.04	72.55±35.61	82.34±38.45	0.011*	0.027*	0.409
V_{B1} (%)	34.23±9.46	41.42±13.91	37.29±10.03	53.34±17.72	0.000***	0.026*	0.000***
V_{B2} (%)	57.48±26.54	69.22±23.57	66.77±28.45	82.76±24.76	0.015*	0.038*	0.069

* significant at p<0.05 ** high significant at p<0.01
*** very high significant at p<0.001
P: p-value between all groups P1: p-value between groups age 12-18 months
P2: p-value between groups age 19-24 months

The Relation Between Socio-economic Class and Anthropometric Measurements

Relation between socioeconomic class and weight-for-age Z-score

The relation between socioeconomic class and weight for age z-score in rural and urban areas were shown in Table 9, that there was very highly significant difference between socioeconomic class and W/A z-score in rural and urban the highest percent for under weight were (60.0) in rural areas for moderate socio-economic class and (100.0%) for the high socioeconomic class in urban areas.

The highest percent for normal growth were (77.8%) in rural areas for moderate socioeconomic class while the highest were more than half (58.3%) in urban areas for high socio economic class. The high percent for over weight (> +2.SD) were in urban for moderate class. It was noticed that most of subject were in medium + 2 SD z-score in rural and urban.

The obtained results in Table 9 were agreed with Welch *et al.*, (1996) A low prevalence of children with a weight for age z-score below -2years as found, including that at the time of the survey protein–energy malnutrition was not a serious problem for this age group.

Relation between Socioeconomic class and length-for-age Z-score

The data presented in Table 10 showed that the highest percent for infant who severe stunting(<-2S.D)was found in moderate socio- economic class in rural areas 100%,while the lowest percent 25% for each low and moderate socio- economic class in urban areas. While the highest percent for normal stunting(M± 2 S.D)was found in rural areas for moderate socio- economic class 73.9%, concerning the urban areas the highest percent were more one half 58.7% for high socio-economic class and there was very high significant difference between socio- economic class and L/A z score.

The obtained results in Table 10 were similar to the results reported by Amany (2000) who found that the high percent for normal L/A were (93%) in moderate class and (91.4%) for high class.

Relation between Socioeconomic class and weight-for-length Z-score

The relation between socioeconomic class and weight for length z-score were shown in Table 11. The results showed that the high percent of severe wasting was 100% for high socio economic class in urban areas while in rural areas the percent was equal 50% for each moderate and high socio-economic class. Concerning the normal Wt/L were found in rural areas for moderate socio-economic class (77.8%) and (58.3%) of urban for high socioeconomic class, while the moderate socio economic class had equal percent100%for over wasting (>+2S.D) z score and finally there was very high significant difference between socioeconomic class and weight for length z-score them.

Correlation Coefficient Between Maternal Educational Level and Dietary Intake as Percentage of RDA

Data presented on Table 12 illustrate that, there were significant association at $p < -0.05$ between maternal education level and calories, calcium and vitamin C intakes in urban and rural areas. The obtained results were on harmony with those obtained by Sohier (2007) who found that there was association between mother education and Vitamin C. Concerning to rural area, there was negative correlation between maternal educational level and calories, protein, calcium and vitamin B2 intake.

Table 9. Relation between socioeconomic class and weight-for-age Z-score

Items	Rural						Urban						Total			
	< -2 SD		Median ± 2 SD		> + 2 SD		< -2 SD		Median ± 2 SD		> + 2 SD				X^2	P
Socio-economic class	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
Low	-	-	8	17.8	-	-	-	-	3	6.3	-	-	11	11.0		
Moderate	3	60.0	35	77.8	-	-	-	-	17	35.4	1	100.	56	56.0		
High	2	40.0	2	4.4	-	-	1	100	28	58.3	-	-	33	33.0	34.215	0.000***
Total	5	100	45	100	-	-	1	100	48	100	1	100	100	100		

*** Very high significant at p<0.001

Table 10. Relation between socioeconomic class and length-for-age Z-score

Items	Rural						Urban						Total			
	< -2 SD		Median ± 2 SD		> + 2 SD		< -2 SD		Median ± 2 SD		> + 2 SD				X^2	P
Socio-economic class	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
Low	-	-	8	17.4	-	-	1	25.0	2	4.3	-	-	11	11.0		
Moderate	4	100	34	73.9	-	-	1	25.0	17	37.0	-	-	56	56.0		
High	-	-	4	8.7	-	-	2	50	27	58.7	-	-	33	33.0	31.504	0.000***
Total	4	100	46	100	-	-	4	10	46	100	-	--	100	100		

*** Very high significant at p<0.001

Table 11. Relation between socioeconomic class and weight-for-length Z-score

Items	Rural						Urban						Total		X^2	P
	< -2 SD		Median ± 2 SD		> + 2 SD		< -2 SD		Median ± 2 SD		> + 2 SD					
Socio-economic class	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
Low	-	-	8	17.8	-	-	-	-	3	6.3	-	-	11	11.0		
Moderate	2	50	35	77.8	1	100	-	-	17	35.4	1	100	56	56.0		
High	2	50	2	4.4	-	-	1	100	28	58.3	-	-	33	33.0	35.178	0.000***
Total	4	100	45	100	1	100	1	100	48	100	1	100	100	100		

*** very high significant at $p<0.001$

Table 12. Correlation coefficient between maternal educational level and dietary intake as percentage of RDA

Nutrients	Rural		Urban	
	r	p	r	p
Calories (%)	-0.13	0.34	0.32	0.02*
Total Protein (%)	-0.07	0.60	0.13	0.34
Minerals (%)				
Calcium	-0.08	0.55	0.28	0.04*
Total Irion	0.14	0.31	0.22	0.12
Zinc	0.17	0.21	0.12	0.38
Vitamins (%)				
V_C	0.26	0.06	0.33	0.01*
V_A	0.25	0.08	0.001	0.93
V_{B1}	0.07	0.60	0.15	0.29
V_{B2}	-0.03	0.82	0.24	0.08

* Significant at $p< 0.05$

Relation Between Socioeconomic Class and Dietary Intakes as Percentage of RDA

Regarding the association between socioeconomic level and percent nutrients intake from RDA, Table 13 revealed that there was a significant association at $P < 0.05$ between rural and urban areas, for rural areas there were a positive correlation between socio-economic level and each of zinc and vitamin C intake while in urban areas there was a positive correlation between socio economic level and each of calories, total iron, zinc, vitamin B1 and vitamin B2. The obtained results were in harmony with those reported by Sohier (2007) who found that there was a significant association at $P<0.05$ between socioeconomic level and vitamin C intake. Mean while, there was negative correlation between socioeconomic class and percent nutrients intake of RDA. In rural areas there was negative correlation between socioeconomic class and each of calorie, protein, calcium, vitamin A, B1 and B2.

Table 13. Correlation coefficient among socioeconomic class and dietary intake as percentage of RDA

Socioeconomic class	Rural		Urban	
Nutrients	**r**	**p**	**r**	**p**
Calories (%)	-0.197	0.169	0.303	0.032*
Total Protein (%)	-0.054	0.709	0.209	0.146
Minerals (%)				
Calcium	-0.240	0.094	0.176	0.223
Total Irion	0.107	0.460	0.293	0.039*
Zinc	0.317	0.025*	0.313	0.027*
Vitamins (%)				
V_C	0.214	0.036*	0.192	0.181
V_A	-0.125	0.292	0.049	0.738
V_{B1}	-0.099	0.492	0.322	0.022*
V_{B2}	-0.245	0.086	0.319	0.024*

* Significant at $p< 0.05$

Correlation Coefficient Between Maternal Knowledge Level and Percentage of Nutrients Intake

Regarding to the association between maternal knowledge level and percentage of nutrients in take, Table 14 revealed that, there was significant association at $p \leq 0.05$ between rural and urban areas. Concerning urban mothers there was negative correlation between the maternal knowledge level and each of calcium and zinc intake.

Table 14. Correlation coefficient maternal knowledge level and dietary intake as percentage of RDA

Socioeconomic class	Rural		Urban	
Nutrients	**r**	**p**	**r**	**p**
Calories (%)	-0.18	0.20	0.12	0.39
Total Protein (%)	-0.04	0.75	0.01	0.93
Minerals (%)				
Calcium	-0.07	0.58	-0.18	0.19
Total Irion	-0.16	0.24	0.14	0.31
Zinc	-0.13	0.23	0.33	0.11
Vitamins (%)				
V_C	0.29	0.04*	0.28	0.05*
V_A	0.15	0.48	0.06	0.66
V_{B1}	0.008	0.95	0.14	0.32
V_{B2}	-0.11	0.42	0.20	0.16

* Significant at $p < 0.05$

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تقييم الحالة الغذائية للأطفال فى سن الفطام

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تعتبر الفترة الأولى من عمر الطفل فترة حرجة خاصة من الناحية الغذائية. من هذا المنطلق تم إجراء دراسة ميدانية للتعرف على الحالة الغذائية لعينة من الأطفال فى سن الفطام ١٢–٢٤ شهر، حيث تم إجراء الدراسة على ١٠٠ عينة عشوائية تضمنت ٥٠ عينة من الريف و٥٠ عينة من الحضر بمحافظة الشرقية كدراسة مقارنة على أساس متوسط المأخوذ من العناصر الغذائية والمقاييس الجسمية للأطفال التى شملت الوزن، الطول بالنسبة للعمر وكذلك الوزن بالنسبة للطول ومقارنة النتائج بجداول النمو الموصى بها من قبل منظمة الصحة العالمية.

أظهرت النتائج أن حوالى ١١,١% من الأطفال لديهم نقص فى الوزن عن المعدل الطبيعى ومعظمهم فى عمر من ١٩–٢٤ شهر فى المناطق الريفية، بينما بلغت أعلى نسبة لنقص الطول ١٢,١% فى عمر من ١٢–١٨ شهر لأطفال الحضر. ووجد أن ١٢,١% من الأطفال فى الريف فى عمر ١٩–٢٤ شهر يعانون من نقص الوزن بالنسبة للطول. وعموما يوجد علاقة معنوية شديدة بين المستوى الإقتصادى والإجتماعى لأسرة الطفل والمقاييس الجسمية.

وجد أن غالبية الأطفال فى الريف والحضر يتم إرضاعهم طبيعيا بجانب إعطائهم أغذية تكميلية، حيث كانت نسبتهم ٨٦,٥% و٨٧,١% على الترتيب. أما بالنسبة للأطفال الذين يتم إرضاعهم صناعيا بجانب إعطائهم أغذية تكميلية فقد كانت نسبتهم متساوية تقريبا فى الريف والحضر (١٣,٥% و١٢,٩%) على الترتيب. وكانت أعلى نسبة للفطام النهائى ٢٦% فى الريف و٣٨% فى الحضر ويوجد علاقة معنوية لنمط التغذية بين الريف والحضر.

يوجد ارتباط معنوى بين المستوى الإقتصادى والإجتماعى لأسرة الطفل ومتوسط نسبة المأخوذ من الزنك وفيتامين (ج) فى الريف. أما فى الحضر فقد وجد أن هناك ارتباط معنوى بين المستوى الإقتصادى والإجتماعى لأسرة الطفل ومتوسط نسبة المأخوذ من كل من الطاقة، الحديد، الزنك، الثيامين والريبوفلافين. ويوجد ارتباط معنوى بين مستوى وعى الأم عن تغذية وفطام الطفل ومتوسطة نسبة المأخوذ من فيتامين (ج) لكل من الريف والحضر.