

Nutritional and Health Status of Infants Under Six Months of Age in El-Obeid City, North Kordofan State

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ABSTRACT

Background and Objective: This study was conducted at Elfatih Elnour Health Centre, El-Obeid, North Kordofan State, Sudan. The study aimed to evaluate the nutritional status of infants under six months of age. **Materials and Methods:** Forty-five infants were selected randomly from 150 infants who visited the centre for following up the growth monitoring. Primary data were collected using structured interview questionnaire and anthropometric measurements then analysed by Statistical Package for Social Sciences (SPSS) software version 16. **Results:** Study results revealed that, most of mothers (87%) initiated breastfeeding after birth and 76% of them breastfed their infants at the first hour after birth. Fifty-eight percent of mothers gave their infants water and artificial or animal milk before six months. Most respondents (98%) continued breast feeding and 51% of them started complementary feeding before six months. Concerning bottle feeding, 38% of respondents used them for drinking and feeding. Study findings indicated that all respondents weaned gradually due to maternal illness. Most of mothers (98%) were followed up by health cadres. There were no any signs of vitamin A deficiency among respondents. Concerning wasting measures, respondents appeared to have normal weight (70%), obese (6%), underweight (20%) and severely underweight (4%). Stunting measures, revealed that respondents were normal (91%), very tall (5%) and stopped growth (4%). Statistical analyses showed that there were no significant correlations between the initiation of complementary feeding and the continuing breastfeeding, the bottle feeding and the diseases affecting the respondents, the awareness and the monthly visit to the centre to monitor the respondents' weight, the gender of respondents and the diseases affecting respondents, the number of under-five members and the awareness of respondents' mother. **Conclusion:** The study revealed generally good breastfeeding practices among mothers attending Elfatih Elnour Health Centre. Nevertheless, early introduction of complementary feeding and non-breast milk liquids before six months remains a significant concern. Nutritional education and promotion of exclusive breastfeeding are necessary to improve nutritional and health outcomes in the study area.

Keywords: Infants, breastfeeding, complementary feeding, bottle feeding, wasting, stunting, weaning, vitamin A.

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INTRODUCTION

According to UNICEF [1] malnutrition is a condition that results from nutrient deficiency or over consumption. There are two types of malnutrition: undernutrition and overnutrition, the first type results from not getting enough protein, calories or micronutrients, it leads to low weight for height (wasting), low height for age (stunting) and low weight for age (underweight). The second type occurs as result of overconsumption of certain nutrients such as protein, calories or fat can also lead to malnutrition this usually results in overweight or obesity. Malnutrition is responsible, directly or indirectly, for over half of childhood deaths. Infants and young children are at increased risk of malnutrition from six months of age onwards, when breast milk alone is no longer sufficient to meet all nutritional requirements, complementary feeding should be started [2].

WHO emphasized the need for greater commitment to appropriate feeding practices for infants and young children in order to promote optimal growth, development, and health [3]. As global public health recommendations, international guidelines stress that infants should be exclusively breastfed for six months, then frequent and on-demand breastfeeding should continue to 24 months and should be coupled with the gradual introduction of complementary feeding adapted to the child's requirements. Infants and young children need special attention in order to attain their nutritional requirements as the period of complementary feeding is particularly vulnerable to nutritional deficiencies due to rapid growth [4].

Infants are at increased risk of malnutrition starting from six months when breast milk alone is no longer sufficient to meet all the nutritional requirements of infants. Children living in most developing countries are introduced directly to the regular household diet made of cereals or starchy root crops, which is a major cause for the high incidence of child malnutrition, morbidity and mortality [5].

A number of studies have shown that there is no growth advantage in breastfed infants being given complementary foods from four months of age, even with very high-quality foods [6].

Delayed initiation of breastfeeding, deprivation from colostrum, and improper weaning are significant risk factors for undernutrition among under-fives [7]. There is a need for promotion and protection of optimal infant feeding practices for improving nutritional status of infants.

The UNICEF reported that a child will be put at an increased risk of malnutrition and illness if complementary foods were introduced well before the age of 6 months [8].

Adequate nutrition during infancy and early childhood is essential to ensure the growth, health and development of children to their full potential. It has been recognized worldwide that breastfeeding is beneficial for both the mother and child, as breast milk is considered the best source of nutrition for an infant and economic and social benefits are also provided to the family, the health care system and the employer [9].

The WHO estimated that being underweight accounts for more disability and loss of life than any other health risk factor and is the underlying cause of more than half of all child deaths in the world [10]. It is estimated to kill nearly 6 million children each year. The FAO estimated that about 840 million people are malnourished in the developing world, and children under 5 years of age are the most susceptible [11].

Complementary feeding is the term used for giving other foods and drinks in addition to breastfeeding after the completion of the 6 months exclusive breastfeeding period [1]. This process covers the period from 6-24 months of age and is a critical period of growth during which infants are at high risk of nutrient deficiencies and illnesses. The ideal age to begin complementary feeding is 4 to 6 months of age because besides filling the gap between the total

nutritional needs of a child and the amounts provided by breast milk, it is the age when nerves and muscles in the mouth develop sufficiently to let the baby munch, bite and chew. According to UNICEF, the frequency and amounts of food that is given may be insufficient, hence hindering the normal growth of the child or their consistency or energy density may be incorrect in relation to the child's needs [10].

Weaning is defined as the process of replacing breast milk with other foods so that the infant is fully weaned after the replacement is complete [9]. The psychological factors affect the weaning process for both mother and infant, as issues of closeness and separation are very prominent. If the baby is less than a year old, substitute bottles are necessary, an older baby may accept milk from a cup [12].

This study was carried out to evaluate the nutritional and health status of the infant under six months of age.

MATERIALS AND METHODS:

Study Area:

This study was conducted at Elfatih Elnour Health Centre, El-Obeid, Shikan locality, North Kordofan State. El-Obeid city, the capital of North Kordofan State in Sudan, is located between latitudes 13.17 North and longitudes 30.22° East, with an average altitude of 650 meters (approximately 2,133 feet) above sea level. It encompasses an area of approximately 81 square kilometres and lies about 588 kilometres (365 miles) southwest of Khartoum.

Study design:

Descriptive cross sectional interventional prospective hospital based designed study.

Sampling techniques:

According to Balal et al. (2014) [13], Forty-five infants were selected randomly, as a study sample, from the total population that visited the centre for growth monitoring (approximately 150), using the following equation:

$$N = \log \left(1 + \frac{\alpha 2 * n}{\alpha 2} \right)$$

Where:

N= size of the sample

$\alpha = 0.01$

n = monthly target

Inclusion criteria: All infants below six months of age, who visited the centre for following up the growth monitoring.

Exclusion criteria:

More than six months of age children and parental refusal to participate in the study.

Data collection:

A well-constructed questionnaire was designed to contain full information about the nutritional and health status of infants under six months of age.

Statistical analysis:

Data were analysed by using Statistical Package for the Social Sciences (SPSS) software version 16 Descriptive statistics as qualitative analysis (percentage, frequency) and correlation coefficients. Appropriate tests for significance at the 5% level were used [14]. The results were presented in tables and figures.

RESULTS AND DISCUSSION

Early initiation of breastfeeding after birth:

As shown in **figure (1)**, most of the respondents' mothers (87%) started the breast feeding for the infants immediately after birth or delivery whereas the remaining of them started breast feeding not immediately after birth. This delay in breastfeeding may be attributed to some cultural reasons and traditions, especially for those who delivered by surgical operation (caesarean section).

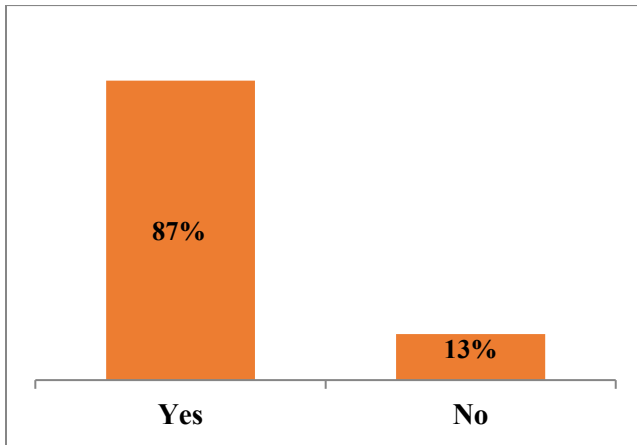


Figure 1 Early initiation of breastfeeding after delivery

First time breastfeeding:

It is obvious that, from the study results, most respondents' infants (76%) started taking breast milk in the first hour after delivery, (13%) after two hours and (11%) after more than two hours (Figure 2). It is important to give the infants the mothers' milk immediately after delivery because this milk is composed of the colostrum, a yellow fluid that is rich in protein and antibodies. This solution increases the infants' immunity and protects them from jaundice. For women, it helps in the excretion of oxytocin hormone which helps them in relaxation and contraction of uterus muscles and cleaning it.

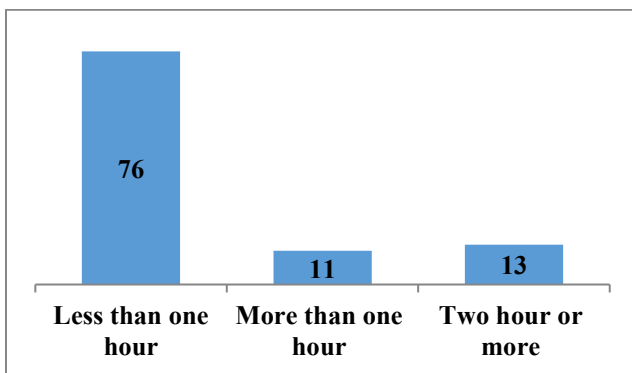


Figure 2 First time breastfeeding

Exclusive breastfeeding:

With regard to exclusive breastfeeding, the study results showed that 76% of the respondents practiced exclusive breastfeeding but the remaining (24%) have not practiced it (Figure 3). The exclusive breastfeeding has some benefits; for instance, it

minimizes the susceptibility of the diseases and the children acquire good immunity. For women, it protects them from early pregnancy, hence it decreases the excretion of oxytocin hormone and increases the excretion of the prolactin hormone.

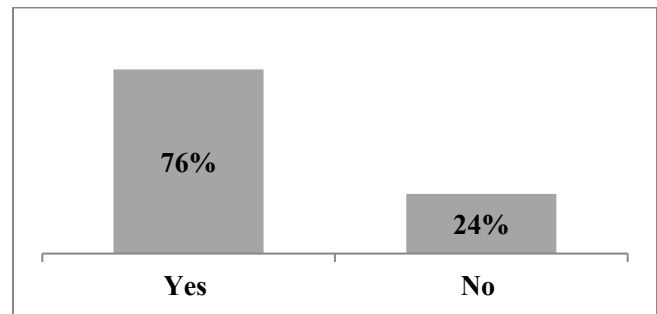


Figure 3 Exclusive breastfeeding among respondents

Feeding of liquids during six months of age:

The study findings showed that 36% of the respondents took water, 22% of them drank animal or artificial milk and 42% of them depended only on breastfeeding before reaching six months of age (Table 1). The recommended age for taking complementary feeding including liquid is after six months of age. The water, artificial and animal milk which was given to the infant during the first six months may decrease the quantity of antibodies present in the colostrum, which leads to decreased immunity. For women, it may predispose them to early pregnancy. These liquids may be a source of contamination if not handled in good and scientifically hygienic manners.

Monthly centre visits for growth monitoring:

According to the study results, 87% of the respondents visited the centre every month for growth monitoring for measuring the length and weight of the infant; however, 13% of them did not visit it (Table 3). Monthly attendance for growth monitoring among most mothers reflects good health-seeking behaviour and awareness regarding child healthcare services. These visits are useful especially for the following up of the infant growth, evaluation of his/her nutritional and health status and taking vaccination doses. In some cases, the delay by the mother to visit the centre for monitoring the growth after delivery might be due to traditional habits.

Table1 Feeding of liquids during six months of age

Feeding type	Frequency	(%)
Took Water	16	36
Animal and artificial milk	10	22
Breast feeding only	19	42
Total	45	100

Continuation of Breastfeeding:

As presented in **figure (4)**, the study results indicated that most (98%) of the respondents continued breastfeeding but only a few of them had been weaned. The early weaning is also reported by Saloojee et al. [15] in South Africa. In the Muslim world, especially in Africa and Sudan, most families obey the teachings of the Quran, which advise of weaning after two years of age. It is well known that breastfeeding for two years or longer helps an infant to develop and grow strong and healthy [10].

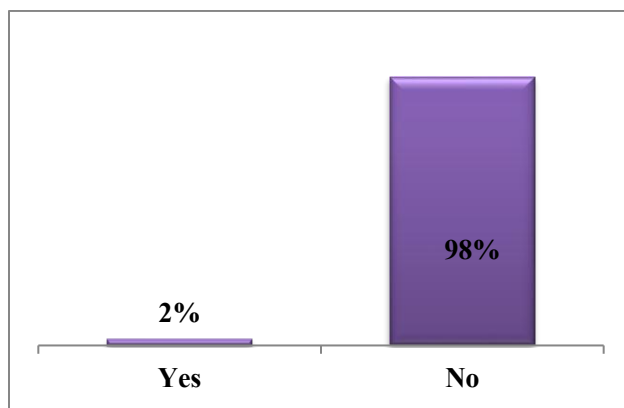


Figure 4 Continuation in breastfeeding

Initiation of complementary feeding:

The study findings postulated that, 49% of the respondents received complementary feeding after completing six months of age whereas 51% of them were given complementary feeding before completing six months (**Figure 5**). According to the statistical analysis, the study results showed that no significant correlation between time of given complementary foods and weaning, the present findings are in agreement with Nabag et al. [16] who investigated children of Omdurman Paediatric Hospital and found no significant relationship

between supplemented foods and the period of weaning. Early complementary feeding may contribute to increased risks of infection and poor nutritional outcomes.

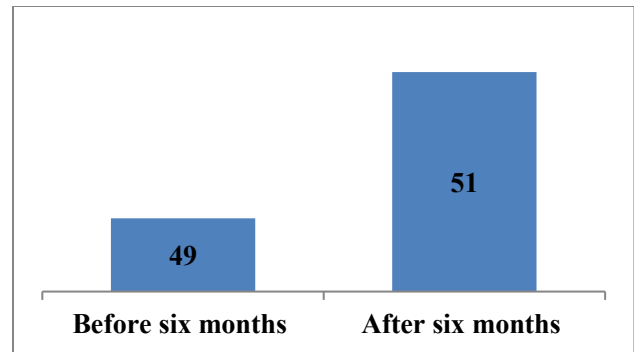


Figure 5 Initiation of complementary feeding

Usage of bottle feeding among respondents:

As shown in **table 2**, the study results verified that 38% of the respondents used bottle feeding whereas the rest (62%) of them didn't use it. Misuse of bottle feeding may cause some disorders such as diarrhoea, chest infection, malnutrition, vitamin A deficiency, obesity, decreased intelligence test performance and increases mortality rate among respondents.

Table 2 Usage of bottle feeding among respondents

Bottle feeding	Frequency	(%)
Used	28	62
Not used	17	38
Total	45	100

Monthly centre visits for growth monitoring:

According to the study results, 87% of the respondents visited the centre every month for growth monitoring for measuring the length and weight of the infant; however, 13% of them did not visit it (**Table 3**). Monthly attendance for growth monitoring among most mothers reflects good health-seeking behaviour and awareness regarding child healthcare services. These visits are useful especially for the following up of the infant growth, evaluation of his/her nutritional and health status and taking vaccination doses. In some cases, the delay by the mother to visit the centre

for monitoring the growth after delivery might be due to traditional habits.

Table 3 Monthly centre visits for growth monitoring

Situation	Frequency	(%)
Visited	39	87
Not visited	6	13
Total	45	100

Wasting among respondents:

The study results indicated that 70% of the respondents had normal weight, 6% of them were obese, 20% of them were underweight and 4% of them were severely underweight (Table 4). These results were evaluated according to WHO Standard Growth Card. The presence of obesity, underweight and severe underweight is considered as malnutrition signs. This may appear due to excess food intake or excessive breastfeeding or due to intake of an insufficient amount of food.

Table 4 Wasting among respondents

Wasting type	Frequency	(%)
Normal	31	70
Obese	3	6
Underweight	9	20
Sever underweight	2	4
Total	45	100

Stunting among respondents:

Concerning the length of the respondents, the study findings indicated that 91% of the respondents were normal, 5% of them were very tall, 2% of them were stunted growth and 2% of them were very stunted growth (Table 5). These results were evaluated according to WHO Standard Growth Card. Stunting may occur due to micronutrient deficiency and it could be treated if the infant has not completed two years of age.

Table 5 Stunting among respondents

Stunting type	Frequency	(%)
Normal	41	91
Very tall	2	5
Stop growth	1	2

Very stop growth	1	2
Total	45	100

Reasons and methods of respondents' weaning:

As shown in table 6, the study findings indicated that 100% of respondents weaned due to maternal illness. Infant illness does not prevent breastfeeding, because the antibodies present in the breast milk strengthen the infant's immune system and the water found in human milk helps the infant decrease the body temperature or fever. Moreover, the study findings indicated that all respondents weaned gradually. The sudden weaning psychologically affects the infant negatively.

Table 6 Reasons and methods of weaning among responde

Reason of weaning	Reasons Frequency	(%)
Mother illness	1	100
Child illness	0	0
Mother pregnancy	0	0
Total	1	100
Weaning method	Methods Frequency	%
Gradual	1	100
Sudden	0	0
Total	1	100

Mothers' visits for following up during pregnancy:

As shown in table 7, 98% of the mothers visited the centre monthly to follow up their pregnancy under the supervision of healthy cadre. These findings indicated the high awareness of mothers towards the importance of the monthly visit and the following up with health cadres as well as their positive effect on the health and nutritional status of the pregnant woman and her baby.

Table 7 Mothers' visits for following up during pregnancy

Monthly visit	Frequency	(%)
Yes	44	98
No	1	2
Total	45	100

Signs of vitamin A deficiency among respondents:

The study outcomes postulated that there were no any signs of vitamin A deficiency among respondents (Table 8). These findings are attributed to the fact that breast milk contains a high amount of vitamin A and to the good nutrition of the mothers.

Table 8 Signs of vitamin A deficiency among respondents

Case of vitamin A	Frequency	(%)
Presence of signs	0	0
Absence of signs	45	100
Total	45	100

CONCLUSION:

The study revealed generally good breastfeeding practices among mothers attending Elfatih Elnour Health Centre. Nevertheless, early introducing of complementary feeding and non-breast milk liquids before six months remains a significant concern. Nutritional education and promotion of exclusive breastfeeding are necessary to improve nutritional and health outcomes in the study area.

RECOMMENDATION:

The study findings recommend the following:

- Strengthen community-based education programs promoting exclusive breastfeeding for the first six months of life.
- Increase awareness regarding the risks associated with early complementary feeding and bottle feeding.
- Enhance maternal counseling during antenatal and postnatal visits.
- Conduct larger multicenter studies to further investigate factors associated with infants' malnutrition in Sudan.

Ethical approval and consent:

This study obtained ethical approval from the Ministry of Health, North Kordofan State in addition to the agreement of Elfatih Elnour Health Centre, El-Obeid, Sheikan locality, North Kordofan State, Sudan. Before enrolment of the infants in the study, the mothers provided informed consent about the study.

Competing interests:

The authors declared that they have no competing interests.

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