



Effectiveness of nutrition education program on mothers knowledge towards breast-feeding and weaning practices of children in Omdurman Pediatric Hospital

Fatima Omer Nabag¹, Amani Abdel karim², Aziza Mohamed,² Nusiba Mohamed Ahmed²

¹Institute of Family and Community Development -Sudan University of Science and Technology

²Department of Family and community Science, College of Agricultural Studies
Sudan University of Science and Technology

ARTICLE

ABSTRACT

ARTICLE HISTORY

Received: 13/5/2018

Accepted: 6 /6/2018

Available online: June 2018

KEYWORDS:

Nutrition education
program,
weaning,
Khartoum,
breast, feeding

The main objective of this study was to assess the effectiveness of nutrition education program on mothers' knowledge towards breast-feeding and weaning practices of children in Omdurman Pediatric Hospital. The quasi - experimental study conducted. The study consisted of all (100) mothers of under-five malnourished children, with a diagnosis of severe protein energy malnutrition (Marasmus, Kwashiorkor and Mrammic Kwashiorkor). Pretest data were collected as the base line information about breast-feeding, weaning, and analyzed. After that, nutrition and health education program prepared to mothers of children in hospital, two times per week during the study. Posttest questionnaire took place after that to identify the results of the program. Data collected analyzed by percentages. Then data before and after program were analyzed by the Statistical Package for Social Sciences (SPSS) Program, chi-Square was used to determine the significance of the differences ($P \leq 0.05$). Results revealed that, before nutrition education, 64% of mothers, their weaning practice were stop abruptly; 31 % of the mothers introduced complementary foods at right time, only 3% of their mother's knowledge about weaning foods. After nutrition education program, 84% of mothers stated that the best situation of weaning practices methods were gradual weaning, 79% of the mothers knew the right time to introduce complementary foods and 91% of their mother had knowledge about weaning foods. The study recommended that it is important for raising awareness on breast-feeding and weaning among mothers of malnourishment children by community leadership .Coordination among sectors supports decision-making and prioritization.

© 2018 Sudan University of Science and Technology. All rights reserved

INTRODUCTION:

Weaning period is the most crucial period in the child development, mother milk alone is sufficient type of infant feeding for the first six months of life (AAP, 2012). In Muslim religious belief as it, is stated in the Holy Quran that, 'a mother shall breast feed her child for two years. One in twenty Sudanese children is severely malnourished, with a greatly increased risk of death (SHHS, 2010). The most common cause of malnutrition in developing countries is inadequate food intake, insufficient food supplies or early cessation of Breastfeeding (Grigsby, 2005). There are many cultural practices that undermine nutrition well-being such as low rates of the exclusive and the continued breast feeding (almost 40% for both), limited dietary diversification either due to lack of food variety or limited knowledge, intra-household food distribution giving priority to men. In addition to, taboos, early marriage, negative perceptions on family planning still predominant among the Sudanese communities (Zhou *et al.*, 2012, Louran *et al.*, 2013). It is important to denote that the global community now concurs that increasing investment in nutrition will accelerate progress on a range of Millennium Development Goals (MDG), especially poverty, education, and maternal and child health (World Bank, 2011).

The result of succession South Sudan from Republic of Sudan in 2011 is a reduction of 30 per cent of the government budget due to the loss of oil revenue (World Bank, 2011). Instability

of the economy has seen double digit inflation, which was affecting prices of all basic commodities and causing a devaluation of the currency. In Sudan 46.5% of the populations are below the poverty line with urban and rural as well as states variation (Ministry of finance, 2012). This means that more families are below the poverty line, which resulted in a decline in household food purchase. Moreover, the high illiteracy levels among Sudanese women - that 50% of them are illiterate are a key challenge to good nutrition practice. These cultural issues hinder positive behavioral practices needed to improve nutrition situation and maternal and childcare (Louran *et al.*, 2013).

Lack of knowledge regarding nutritional needs of infants and child rearing is a universal problem in Sudan and there is much evidence today to suggest that infant mortality rate can be brought down by making all mothers aware of the nutritional needs of infants and child rearing. Maternal education has emerged as a key element of addressing the child malnutrition (Louran *et al.*, 2013).

Changing health and nutrition behaviors in the community requires both input from individuals who possess knowledge and credibility and a receptive audience. It would be a great help in changing communities behavior towards their nutritional habits by a group that could be effective and who have a unique position in most communities such as the religious leaders and elderly women public committees. They possess extraordinary credibility and influence

by virtue of their association with their honored religious traditions and positions in the community (Anshel and Smith, 2013).

Objective of Mohsin *et al.*, (2014) study was to determine to knowledge attitude and practices of mothers regarding complementary feeding. Descriptive study conducted at outpatient department of Civil Hospital Karachi over duration of 12 months. Results showed that knowledge attitude and practices of mothers regarding complementary feeding was poor in terms of quantity and quality. Commonest age of introduction of complementary feeding was before 6 months with readymade items as their first choice.

Abdel Fadeel (2004) assessed the impact of health education programs in raising the awareness of the mothers' knowledge, attitudes and practices about feeding of children less than two years of age in Omdurman. The result of the study from pretest questionnaire showed The objectives of Kale and Kulkarni (2014) study were to assess existing knowledge on complementary feeding among the mothers of infants and to assess the effectiveness of planned health teaching programme on complementary feeding. Mothers of infants whose children's are under 5 yrs of age were selected as per criteria and the informed consent was taken from mothers, demographical data was collected and recorded then pre-intervention knowledge was checked through structure questionnaire and recorded in intervention phase. Planned

that, the majority of lactating mothers (59.4%) experimental group & (55.7%) control group had known the suitable age for supplementary –feeding. (59.4%) experimental group & (60%) of control group had known that the importance of breastfeeding according to child demand, meanwhile (84.4%) of experimental group & (86.9%) of control group, had known that the long duration of breastfeeding that has positive effect of both mother & her child. After the intervention programs to experimental group, the study revealed that (66.8%) of lactating mothers in experimental group did not practice breast-feeding according to child need. (84.3%) of mothers' experimental group did not continue breastfeeding during the sickness of the child. The study recommended that, health and nutrition education should concentrate on child nutrition, and improving of mothers' attitudes & practices regarding their infants' nutritional status, and feeding.

health teaching given on complimentary feeding as an intervention and in post intervention phase, assessment of posttest knowledge done through structure questionnaire on 7th day after pretest, so the investigator concluded that there is significant increase in the knowledge after administration of planned health teaching.

Therefore, the main objective of this study was to assess the effectiveness of nutrition education program on mothers knowledge towards breast-feeding and weaning practices of children in

Omdurman Pediatric Hospital, before and after nutrition education Programs.

MATERIALS AND METHODS

The study consisted of all (100) mothers of under five mothers malnourished children, attending Omdurman Pediatric Hospital in Khartoum State, Sudan, with a diagnosis of severe protein energy malnutrition (Marasmus, Kwashiorkor and Mixed Kwashiorkor), quasi experimental one group pre-test and post-test design was used. To carry out this study, permission for ethical approval was taken from mothers of malnourished children attending hospital. The mothers of malnourished children briefed about the nature and objectives of the study. Researchers carried out the survey; the questionnaire was pre-tested to handle corrections and clarification. Data that recorded included information on identification data of children (type of malnutrition, sex, age of child, birth order, children in family less than five years and immunization status of the child), and identification data of parents (age of mothers, educational level and occupation of parents, income of the family). The study assess, the current knowledge and practices of mothers about feeding pattern (type of feeding offering since birth, causes of artificial feeding, duration of breast-feeding) of malnourished children. Mothers' knowledge and practices on weaning foods of malnourished children assess (weaning practices methods, time of starting additional food, knowledge of weaning foods, number of meals, type of

food given method of feeding, types of sterilization). Pretest data collected as the base line information about breastfeeding and weaning practices and analyzed. After that, the researchers, prepared nutrition education program in the hospital, which included diverse activities like: (lectures by power point, and groups' discussions), two times per week in hospital during the study, to correct the bad knowledge, wrong practices found. Posttest questionnaire took place after that to identify the results of the program.

Data collected were analyzed by percentages. The researchers analyzed data before and after program using the Statistical Package for Social Sciences (SPSS) Program, chi-Square used to determine the significance of the differences ($P \leq 0.05$).

RESULTS AND DISCUSSION:

Table (1) shows identification data of parents of malnourished children. About 17.0% of mothers belonging to the age 40 years and above, higher prevalence of illiteracy among mothers and fathers (50%, 35% respectively), the lowest educational level of the mothers considered a risk factor for malnutrition in the present study. Findings of this study are in agreement with Nabag *et al.*, (2013), (Louran *et al.*, 2013) and Ahmed (2003) which found that low level of mothers education was associated with high relative risk and high etiologic for malnutrition. Lack of knowledge on the importance of appropriate feeding for infant and young children and awareness

of nutritional needs depends on educational levels (Song-Suk, 2005).

Another aspect of socioeconomic development was income, 97% of the families earn less than 750 SDG per month, which is less than 25 Sudanese pounds per day. It should be noted that all the families in the current study are living in urban societies; this income is much less than covering daily needs which might lead to malnutrition for children under five because both food and health services is under the family

financial capacity. Ministry of finance (2012) found 46.5% of the Sudanese populations are below the poverty line with urban and rural as well as states variation. The common international poverty line in the past has been roughly \$1 a day. In 2008, the World Bank came out with a revised figure of \$1.25 at 2005 purchasing-power parity (Song-Suk, 2005). WHO/EMRO (1995) stated a rise in income almost results in rise in food expenditure.

Table 1: Identification Data of parents of malnourished children

Identification data of parents of malnourished children	%
Age of the mother:	52
20 -29 years	19
30 - 39 years	12
40 years and above	17
Educational level of mother:	
Illiterate	50
Khalwa	5
Basic education	30
Intermediate	10
Secondary	5
Educational level of father:	
Illiterate	35
Khalwa	20
Basic education	20
Intermediate	15
Secondary	10
Working condition of mother:	
Working	8
House wives	92
Working condition of father:	
Professional Working	10
Not Professional Working	85
Not Working	5
Income of the family in month:	
< 500 Sudanese Pounds	52
500 – < 750 Sudanese Pounds	45
> 750 Sudanese Pounds	3

As shown in Table (2) result revealed that 59 % of children had Marasmus, 17% had kwashiorkor, and 24% had Mrasmic Kwashiorkor. This result agrees with Alsubaie (2000). Males

(55%) found to be more malnourished than female (45%). This results agree with Mbago and Namfua (1991). Boys considered favored by the mothers than girls and the probability of being

malnourished considered lower for the boys than the girls, the needs of males are more than needs of females because of the different in weight and activity (Moragan, 1986). 83% of the families had more than two children under five years old, higher birth spacing is likely to improve child nutrition, since the mother gets enough time for proper childcare and feeding. This result agree with Louran *et al.*, (2013) who stated

that, taboos, early marriage, negative perception on family planning still predominant among Sudanese women. 64% of malnourished children had incomplete vaccination. The relationship between immunization and prevention of malnutrition is well established. Childhood vaccination may protect children's nutritional status and lead to improved child growth in developing countries (Anekwe and Kumar, 2012).

Table 2: Identification Data of the Malnourished Children

Identification data of the malnourished children	%
Type of Malnutrition	
Marasmus	59
Kwashiorkor	17
Mrasmic Kwashiorkor	24
Sex	
Male	55
Female	45
Age of the child	
2m < 1 years	10
1 < 2 years	66
2 – 5 years	24
Birth order	
First	21
Second	15
Third	21
Fourth	17
Fifth and more	26
More than two children in family less than5 years	
Found	83
Not found	17
Immunization status of the child	
Completely	64
Incompletely	36

Breastfeeding is a common practice in Sudan. Breastfeeding knowledge of the participants assessed and 100% of mothers had the knowledge on the importance of breastfeeding the infants. Mothers interviewed, about exclusive breast-feeding practices; they knew that exclusive breastfeeding given for 6 months. However, none of the babies was exclusively breastfed and all the mothers gave pre-lacteal feeds ranging from pure water, Water with salt and

sugar and Water with date or herbal tea. Mothers give some water, juice, cow's milk, cereal porridges etc in addition to breast-feeding (Dewey, et.al., 1995). Avoid exclusive breastfeeding are some of the cultural practices still prevalent in many areas and societies, There is a belief that exclusive breastfeeding causes deafness to infants. Results found that a grandmother's own infant feeding practices influenced mothers' decisions to initiate and continue breastfeeding.

The diversity of Sudanese communities culture is critical challenge for changing

among the community towards maternal and child nutrition (Louran et al, 2013).The study agrees with result of Gebre and Madhin (2000), which revealed that exclusive breast-feeding was rarely practiced in either the rural or urban areas of Tanzania. Mohammed (2014) found that only 6.8% of the Table (3) shows the feeding pattern of the malnourished children. 80% of malnourished children their feeding pattern were breast-feeding, actually, 76% of malnourished children their age less than two years (Table,2), that means 4% Of children were breast-feeding after two years. 60% of respondent the duration of breast-feeding was 6 months, only 2% the causes of artificial feeding was time factors, 46% due to diseases of children, 35% due to pregnant of mothers, 10% due to diseases of mothers, 7% due to refuse of children. In present study, the duration of breastfeeding, is becoming shorter, due to the same reasons mentioned by AlMadanie and Khashogy (1991), the

the incorrect habits and practices

Northern Kordofan mothers practiced exclusive breastfeeding. The World Health Organization recommends the practice of exclusive breastfeeding of infants for the first 6 months after birth and continues breastfeeding with supplementary diet up to two years or more (WHO .2015).

causes of artificial feeding were pregnant of mother, diseases of children, and diseases of mothers. 60% of mothers stopped breastfeeding when the child was 6 months old or less, 25% when child was 7 -12 months old and 10% stopped breastfeeding when the child was 13-18 months old and only 5% stopped breastfeeding when the child was 19-24 months old. To sustain growth complementary feeding should be adding at six months, with continued breast feeds until at least the age of two (WHO, 2003). Breastfeeding is important, for not only child health and survival but it is an important determinant of fertility, and mother health (Labbok *et al.*, 1994).

Table 3: Feeding pattern of the malnourished children

Feeding pattern of the malnourished children	%
Type of feeding offering since birth	
Breast-feeding	80
Artificial feeding	20
Causes of artificial feeding	
Time factors	2
Diseases of mothers	10
Diseases of children	46
Pregnant of mothers	35
Refuse of children	7
Duration of breast-feeding	
6 Months or less	60
7 – 12 Months	25
13 -18 Months	10
19 – 24 Months	5

Table (4) shows association between mothers' knowledge and practices on

weaning foods of malnourished children before and after nutrition education.

Before nutrition education 64% of mothers, their weaning practices method was stop abruptly; mothers stopping breastfeeding within few days by paint their breast with pepper, starchy materials (Ageen or dough) or colored

their grandmothers. In general, in most of the Sudanese society women, it is the custom to physically separate children from their mothers at weaning and give them to their grandmothers. After nutrition education, 84% of their mothers stated that the best situation of weaning practices methods were gradual weaning.

As shown in table (4) only 31% of the mothers introduced complementary foods at right time, 60% introduced before six months and 9% introduced after six months. The World Health Organization recommends a gradual weaning period from 6 months to 2 years (WHO, 2006). The late introduction of complementary foods is disadvantageous, because infant growth stops or slows down and the risk of malnutrition and micronutrient deficiency increase (WHO, 2006). Only 3% of their mother's knowledge about weaning foods before nutrition education lectures. Moreover, lack of knowledge and misperceptions among elderly women like mothers-in law, who generally influence and guide child feeding practices in the family, are often barriers to initiating complementary feeding at the correct age. In addition, the initiation and weaning of breast-feeding strongly influenced by cultural beliefs, due to lack of knowledge and special needs of growing child malnutrition is another common problem during weaning (Kliegman et al., 2006). The study found that children of weaning age stop growing well due to

material , Less than quarter (23%) of mothers stated that they gradually wean their children, 13% of mothers, separated their children by giving them to

the worse during the weaning period and poor feeding. After health education lectures, 79 % of the mothers know the right time to introduce complementary foods and 91% of their mother's knowledge about weaning foods. WHO (1996) stated that it is essential to start weaning foods at 6 months of age in addition to being high quality food.

Table 4 show that before nutrition education, 46% of the children have 3 meals / day, 46% of children eating 6 meals / day, while 8% of children eating more than 6 meals / day for reasons of hunger and satiety, stomach capacity and adequate growth. This knowledge factor had no significant bearing on their children's nutritional status. This finding explained that income was an intervening factor affecting the children's status. It is likely that, although the mother had the knowledge she needed, she was unable to put it into practice because of economic or time constraints. Knowledge of weaning, duration of breastfeeding and frequency of feeding were similar in studies in Sudan Suliman *et al.*, (2011), and in Kenya (Waihenya *et al.*, 1996). After nutrition education, 95% of mother children said that children meals should be six meals / day. Waihenya et al. (1996) found that children were still at high risk of malnutrition despite adequate nutrition knowledge by the mothers. Willingness and ability to translate this nutrition knowledge into action is crucial in reducing levels of malnutrition (Jalil, 1991).

It is obvious from the results that none of infants consumed fresh fruits, vegetables. The main items of food that consumed by children were carbohydrates such as *nasha* (semi solid liquid cooked from sorghum), rice and potatoes. Carbohydrate and protein food consumed by children were *Aceda* (porridge cooked from sorghum) and mullah *sharmout* (mixed of minced meat, onion, Okra & spices) bread or *kesra* and legumes (for example lentils or broad bean, cowpea ...etc). Table 4 indicates that more than third (42%) of the mothers feed their infants with their hand, 20% of mothers using cups, 34% of mothers use bottles while 15% feed their infant by spoons. Feeding complementary foods from a cup or bowl with a spoon also familiarizes the infant with textures, flavors and smells, whereas diluting these foods with prepared formula or other liquids, as is necessary to feed them by bottle, deprives the infant of these sensory experiences. Feeding from a cup thought to enhance the development of chewing

Carbohydrate, protein and fat food consumed by children were *kesra* or bread or rice and mullah or soup cooked with little meat or Maraga (Cubes of chicken feed) and vegetables. The mothers do not give her child egg because there is a belief that eating egg delay child talk. During weaning period, generally it is important that weaning foods contain energy and building materials for example carbohydrate, protein and lipids (Musaiger, 2005).

and swallowing mechanisms. To decrease the risk of infection with introduction of complementary foods, it recommended that prepared formula and complementary foods be fed with a cup and spoon, which is thought to be safer microbiologically than feeding with a bottle and hand (Knight *et al.*, 1992). Breast milk is perfectly safe for babies. However, as soon as a baby fed other foods, infection with germs is more likely. This is why so many babies begin to get diarrhea during weaning.

Table 4: Association between Mothers' knowledge and practices on weaning foods of malnourished children before and after nutrition education

Mothers' knowledge and practices of nutrition education program	Before lecture	After Lecture	Chi-Square	P. value
Weaning practices methods	%	%		
Gradually wean	23	84		
Stop abruptly	64	16	76.57	0.000
Separation	13	0		
Time of starting additional food				
Before 6 Months	60	38		
At 6 Months	31	60	2.59	0.10
After 6 Months	9	2		
Knowledge of weaning foods				
Yes	3	91		
No	97	9		
Number of meals				
1 – 3	46	4		
4 – 6	46	95		
7 and above	8	1		
Type of food given				
Carbohydrates only	15	1		
Carbohydrate and protein	43	13		

Carbohydrate, protein and lipids	42	86		
Method of feeding				
Hand	64	41		
Bottle Feeding	3	15	0.000	30.06
Cup	29	20		
Spoon	4	15		
Types of sterilization				
Boiling water	34	11		
Boiling water with soap	63	86	0.000	15.30
Just water	3	3		

To avoid the danger of a baby getting an infection, you should teach the parents to prepare weaning mixes carefully, under the most hygienic conditions possible.

before the baby fed. Do not let flies or other insects settle on any food. 63% of children, the type of sterilization was boiling water with soap. This study found that the family living condition were very poor. 63% of mother's children get their water from Caro Result revealed that 97% of the families earns less than 750 SDG per month, higher prevalence of illiteracy among mothers and fathers (50%, 35% respectively). 83% of the families have more than two children under five years . Only 2% the causes of artificial feeding was time factors .Before nutrition education programs 'only 3% of their mother's knowledge about weaning foods .After nutrition education programs, 79 % of the mothers know the right time to introduce complementary foods and 91% of their mother's knowledge about weaning foods.

The study recommended that, it is important for making change in community awareness and knowledge about nutrition, and raising awareness of breast-feeding and weaning among mothers of malnourishment children in poor areas by community leadership, that could be effective and have a unique position in most communities. Coordination between multi-sector

The utensils used to feed the baby kept clean and hands washed before food is prepared and

(donkey cart), while 82 % of mother children had pit hole (traditional) and 18% had no latrine. Park and Park (2002) stated that where families living condition are poor children suffer from malnutrition.

approaches, to support prioritization and decision-making.

The limitations of this study included the absence of a comparative group, short time of program, concepts of exclusive breastfeeding after program and the effect of mothers' program to changing knowledge and practices.

REFERENCES:

- AAP, American Academy of Pediatrics Section of Breastfeeding (2012). Policy statement: *breast-feeding and the use of human milk. Pediatrics. 129: e827-41.*
- Ahmed AF (2003). Assessment of the nutritional status of the primary school children aged 6 – 12 years in Khartoum area. A dissertation submitted in partial fulfillment of M.Sc. Ahfad University for women Khartoum.
- AbdelFadeel Andera AbdelFadee (2004). The impact of health education pprograme on mothers' knowledge, attitudesand

- practices regarding their infants' nutritional status at EL-Shegilla block Abu said Locality, Omdurman Government. Khartoum State. A thesis submitted to the University of Khartoum in fulfillment of the requirement of MPEH by research (Health Education)
- AlMadanie Khalid and Khashogy (1991). Breast-feeding. Dar AlMadanie. Jada, Saudi Arabia.
- Alsubaie Laila (2000). Diseases of malnutrition, Monshat Elmarief, Alexandria.
- Anekwe, T.D. and Kumar, S (2012). The effect of a vaccination program on child anthropometry: Evidence from India's universal immunization program J. Public Health; doi:10.1093.
- Grigsby Donna G., MD, (2005): Malnutrition. Guidelines for breast-feeding and complementary feeding. NJI 2001; 92: 237-240.
- Kale. A and Kulkarni. M (2014). Effectiveness of planned health education programme on knowledge related to complementary feeding among
- Kliegman, S., Stanton, Geme S, Behrman S. (2006). Feeding healthy infants, children and adolescents. In: Stetler N, Bhatia J, Parish A, Stralings VA, Nelson text of pediatrics 19th ed., 164-165.
- Knight, S., Toddayan. W, Caique, W.C., Kyi. W., Barnes. A, and Desmarchelier. P. (1992). Risk factors for the transmission of diarrhea in children: Case – control study in rural Malaysia *.IntJ Epidemiol;221:812-818.*
- Anshel, M.H. and Smith, M (2013). The Role of Religious leaders in Promoting Health Habits in Religious Institutions. J Relig Health .Complementary Feeding. Journal of the Dow University of Health Sciences Karachi 2014, Vol. 8 (1): 21-25 Dewey, K.G. Wesseling, W. and Heining, M.J. (1995). Do infant intake and growth rate change after termination of breast-feeding in the second year of life? FASEB J.; 9:A755.
- Gebre-Medhin, M.J. *et al.*, (2000). Feeding practices of rural and urban Tanzania. *Journal of Public Health and Nutrition.* 3(4): 425-31.
- Jalil F (1991). The principles and strategic steps of a simple nutrition message. *Acta Paediatrica ; Scand. (Suppl.) 1991; 374: 160-167.*
- mothers .Innovations in Pharmaceuticals and Pharmacotherapy IPP, 2 (3): 395-402.
- Labbok M, Cooney K and Coly S (1994). Guidelines: breastfeeding, family planning, and the lactational amenorrhea method-LAM. Washington, DC: Institute for Reproductive Health/Georgetown University.
- Louran et al. (2013). An Evidence-Based Policy Brief, Problem of malnutrition in Sudan. Federal Ministry of Health, Khartoum, Sudan
- Mbago, MC, and Namfua PP (1991). Some determinants of nutritional status of on-to-four-year-old

- children in low income urban areas in Tanzania. *J. Trop. Pediatr*; 38(6):299-306.
- Ministry of Finance, (2012). *Interim Poverty Reduction Strategy Paper*. Khartoum: Ministry of Finance. Month, 48, 703 – 712.
- Mohammed Somiya Gutbi Salim (2014). Infants feeding and weaning practices among mothers in Northern Kordofan State, Sudan. *European Scientific Journal, edition vol.10, No.24*
- Mohsin Shazia Samad et al (2014). Knowledge Attitude and Practices of Mothers regarding
- Morgan, Ehsan Mustafa (1986). A guide education- Ministry of Health-University of Khartoum for publication.
- Musaiger, Abdulrahman (2005). Food and Nutrition. Academically International-Lebanon Beirut
- Nabag, Fatima Omer, Ahmed Elawad Elfaki and Omer Khidir Ahmed (2013). Socio - economic and environmental risk factors of protein energy malnutrition among children under five years
- Suliman O.S. Salih M.A, Karrar Z .A, Mohammed AO, Helsing, C. (2011). Infection and immunoglobulin levels in Sudanese children with severe nutritional status of pre-school children in a Nairobi slum. *East Afr. Med. J.*; 73:419-423. 33.
- WHO (1996). Control of diarrhea diseases, NCDDP, Ministry of Health, WHO, UNICEF, Cairo, 5-33.
- WHO (2015). Exclusive breastfeeding [Internet]. WHO. [Cited 2015 Jun 11]. Available from:
- World Health Organization (2003). Global strategy for infant and of age in Omdurman pediatric hospital. Park JK, and Park K (2002). Park's textbook of prevention and social medicine .New Delhi Banarsides Bharat Publishers; p.472, 800,552
- Pelto G .H, Armar-Klemesu M, Siekmann J,(2013) Schofield. "The Focused Ethnographic Study Assessing the Behavioral and Local Market Environment for Improving the Diets of Infants and Young Children 6-23 months old and its use in three countries ." *Mater Child Nutrition Supplement*, January 11, P: 35-46.
- Song-Suk, K. (2005). A study on infant weaning practices based on maternal education and income levels. *Journal of the Korean Society of Food Science and Nutrition* 34 (7) 1000–1007.
- SHSS, (2010). Sudan Household Survey analyzed using WHO Growth Standards, National Level Survey in Sudan. Khartoum: Federal Ministry of Health.
- protein-energy malnutrition. *Sudan J. Paediatr.*; 11(2):32-42.
- Waihenya WE, Kogi-Maku W, Muita JW (1996). Maternal nutritional knowledge and http://www.who.int/nutrition/topics/exclusive_breastfeeding/en/
- WHO/EMRO (1995). The state of child health in the eastern Mediterian region. 2nd ed., Geneva, WHO, P. 1 – 172.
- World Bank - Africa Region (2011). "Sudan: Country Economic Brief." <http://siteresources.worldbank.org/> young child feeding. Geneva, WHO, . Available

from:http://www.who.int/nutrition/publications/infantfeeding/Infant_feeding.
World Health Organization, (2006).
“Complementary Feeding.” 30
Nov 2006.WWW.WHO.Org.

Zhou, H. Wang XL, Ye, F. Zeng XL and Wang, Y. (2012). "Relationship between Child feeding practices and malnutrition in 7 remote and poor countries, PPR China." *Asia Pac J Clin Nutr*, February 3, 134-140.