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Ekhlas A.I. Mohammed
Khartoum University

Zainab Taha
Zayed University

Agba A.A. Gadah-Eldam
Khartoum University

Mariam M. El Hidai
Sudan University

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Assessment of a Nutrition Education Program designed to Enhance Mothers' Attitudes on Infants and Young Children feeding in Sudan

Ekhlash A. I. Mohammed¹, Zainab Taha^{2*} , Agba A. A. Gadah-Eldam¹, Mariam M. El Hidai³

¹Department of Family Science, Faculty of Education, University of Khartoum, Khartoum, Sudan; ²Department of Health Sciences, College of Natural and Health Sciences, Zayed University, Abu Dhabi, United Arab Emirates; ³Department of Family Sciences, College of Agricultural Studies, University of Sudan, Khartoum, Sudan

Abstract

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***Correspondence:** Zainab Taha, Department of Health Sciences, Zayed University, Abu Dhabi, United Arab Emirates. Telephone: +971-2-5993111. Fax: +971-2-4434847. E-mail: zainab.taha@zu.ac.ae

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AIM: The objective of the study was to assess the effect of a designed nutrition education program (NEP) on maternal attitudes.

METHODS: A control two groups, quasi-experimental and pre- and post-experimental, were adopted. Data were collected through personal interviews of two groups using a validated questionnaire. The NEP was conducted in three phases. Phase 1 was the pre-evaluation, Phase 2 was the program's implementation, and Phase 3 entailed post-evaluation of the program.

RESULTS: The results supported the efficient role of the NEP intervention in raising mothers' attitudes toward nutritional care of under 2 years in Sennar Locality, Sudan. There was no significant difference between the two groups with respect to the controlled variables; mother age, mother education, mother occupation, husband occupation, number of children less than 5 years, family size, and child's age, which indicate that the two groups were homogenous, that is, no significant difference between mothers' attitude of the two groups before applying the NEP. The results showed the effectiveness of the NEP in developing experimental group mother's attitudes, comparing post-test with pre-test in favor of post-test to be statistically significant. NEP has a huge impact in developing the mother's awareness post-test, measuring and developing the mother's attitudes compared to post-test with pre-test.

CONCLUSIONS AND IMPLICATIONS: The nutrition education intervention demonstrated its effectiveness in maternal attitude. The study provided valuable baseline information to develop appropriate training courses and NEP to raise maternal awareness and attitudes toward infants and young children's nutrition.

Introduction

Children and infants are the nation's most important resources. Thus, they deserve the best possible nutrition education care for their present and future health. Improving infants and young child feeding practices are of paramount importance to improve nutrition, health, development of children, and, ultimately, impact child survival [1]. Undernutrition is associated with growth faltering, micronutrient deficiencies, delayed cognitive development, and morbidity [2].

The Sixty-fifth World Health Assembly (WHA) endorsed the Comprehensive Implementation Plan on Maternal, Infant, and Young Child Nutrition (MIYCN) [3]. The WHA resolution urges Member States to put the MIYCN Plan into practice by including proven nutrition interventions relevant to the country in maternal, child, and adolescent health services and care. Interventions should ensure universal access and establish and engage policies in agriculture, trade, education, social support, environment, and other relevant sectors to improve nutrition.

Moreover, many researchers had found that nutrition education played an important role in dealing with health problems and raising the level of nutrition knowledge and practices among women in terms of improving food recipes, increased dietary adequacy and growth, and reduced morbidity [4], [5], [6], [7].

Nutrition education intervention programs include different categories of strategies that focus on nutritional awareness, such as individual counseling, interpersonal communication, and home visits [8], [9], [10], [11].

Many studies and the human capital theory showed that the educational level and socioeconomic status have more influence than the low attendance of antenatal care visits and therefore play an essential role in combating improper feeding habits and practices [12], [13].

Infants and young children in different remote areas in Sudan, including the Sennar locality where the current study was conducted, might be at risk of undernutrition and other related diseases due to a lack of nutrition education program (NEP) [14], [15].

Reviews of nutrition education provided evidence that children were not born with the innate

ability to choose a nutritious diet; instead, their food habits are learned through experience and education. For example, children left to their own choices will not automatically select healthy foods. Their innate preference for sweet foods makes them particularly vulnerable to the highly sugared cereals, soda, and candy marketed to them virtually from birth [16], [17].

According to Sudan Household Health Survey, 2010 implemented by the Federal Ministry of Health (FMH) in the northern states, the nutritional status of under-5 children was reported as 32% underweight, 35% stunted, and 16% wasted. Based on the results of the survey, Sennar State had a high percentage of poor nutrition status among children aged under 5; 42.6% underweight, 47.1% stunted, and 21.6% wasted [18], [19]. Therefore, Sennar State was identified as the most in need of awareness and practices interventions of NEP, among other states, for mothers to improve the children's health and nutritional status.

The findings of the study conducted by the FMH Integrated Management of Childhood Illnesses (IMCI) in Gabel Moya area in Sennar Locality that aimed to assess mother's knowledge, attitude, and practice (KAP) showed that 15.4% of the mothers did not know any advantage of breastfeeding to the infants and young children, 11.8% thought that exclusive breastfeeding should be continued until the 4th months of life, approximately 52.2% practiced breastfeeding till 4 months, while 8% continued breastfeeding until the 6th months of age. Most mothers (82%) were unaware of the component of the adequate nutrient meal [20].

Mothers are the foremost providers of primary care for children. Their understanding of essential nutrition and health measures strongly influences the care that they provide. The aspects of nutrition knowledge include the proper age for introducing solid foods and the type of solid foods to be introduced, frequency of child feeding, diet during diarrhea, and the mother's perceptions of her own child's nutritional status. Mothers' practical nutrition knowledge is essential for child health outcome [21].

Poor infant feeding practices directly or indirectly contribute to undernutrition, morbidity, and mortality in infants [2]. Because of evidence that nutrition education empowers a mother to maximize her resources, the lack of awareness may cause a faulty diet that would affect the child's health [22], [23]. The main goal of nutrition education is to create positive awareness of feeding practices. However, until now, most of the studies conducted on infants and young children feeding in Sudan have been confined to assessing the nutritional status of infants and young children, while in-depth studies for the evaluation of NEP are limited, revealing a clear knowledge gap. As healthy eating habits are established early in childhood, it is crucial to assess the NEP. The aim of

this study was to investigate the effect of a NEP that was implemented to raise mothers' attitudes toward nutritional care of children below the age of 2 in the Sennar Locality.

Methods

Study design

A quasi-experimental pre-/post-design was conducted during July 2014-January 2015 in Mayerno and El Salaam area in the Sennar Locality, Sudan. Mothers of children below the age of 2 were enrolled in the study by random systemic sampling technique. The participants were assigned into two groups of 136 mothers, the intervention area Mayerno (Group A) and Group B, the comparison area (El Salaam). A pre-tested structured questionnaire designed by the IMCI community component (KAP) survey questionnaire program was adopted and modified to collect the data related to the objectives of the current study. Ethical approval was obtained from the Ethical Committee, FMH, Sennar State. Additional clearance was obtained from the local health authorities and locality. Informed consent was obtained from the participants, and several measures were taken to ensure privacy and confidentiality throughout the study period by excluding personal identifiers during data collection.

Instruments, measures, and procedures

The questionnaire consisted of two sections:

Section 1 included general characteristics and socioeconomic demographic information of respondents, for example, mother age, educational level, occupational for mother and father, family size, and child's age.

Section 2 included information about mothers' attitudes concerning the nutritional care of children below the age of 2, for example, breastfeeding, complementary feeding, and feeding methods of children). A score of 0–1 was given to the answers based on the answers' correction.

Phases of the study: The study was composed of three phases

1. Phase 1 (baseline data): Data were collected from the two groups (the experiment and the control groups) through face-to-face interview method during the home visits to fill the pre-questionnaire
2. Phase 2 (implementation of the program; intervention phase): The program was implemented on the following steps

- One day workshop was conducted in the Sennar Locality health office to train four nutrition educators and two female nutrition officers who helped later in all stages of the study, including the teaching sessions
 - The nutrition education program targeted all mothers of children under 2 years of age in Mayernounits in Sennar Locality. The sessions were taught in 4 days following a specific schedule for each group of mothers. Different teaching methods and tools, including training manuals, posters, and pamphlets, were used. At the end of each session, group discussion was held followed by evaluation questions to measure the awareness progress and benefit from the manual
 - Seminars were conducted three months after the implementation of the program. These seminars were the summary of the four nutrition education sessions, addressed to all mothers to maximize the benefits.
3. Phase 3 (Evaluation phase): In this phase, the data related to the indicators of the study were collected using the same methods of data collection used in Phase 1 about the mothers' attitude toward under 2 years children nutritional care, the same mothers in the pre-evaluation phase were asked in the post-test, and the same questionnaire. Secondary data were collected from updated references (books, journals, and internet) and relevant previous national and international studies.

Data analysis

Data analysis was conducted using Statistical Package for the Social Sciences (IBM SPSS Statistics for Windows, Version 20.0) [24]. Both descriptive and inferential statistics were applied to analyze the data. T-test and Chi-square tests were used to analyze continuous and categorical data, respectively. Alpha Cronbach and Spearman-Brown equations were applied for reliability. Person correlation coefficients, t-test for two groups, t-test by pairs, and Chi-square test were also used.

Results

Sociodemographic and child characteristics

One hundred and thirty-six respondents, with the majority being below the age of 30, were successfully interviewed and participated in the study. All mothers were housewives, and most of them had a moderate level of education. The majority of the husbands were

engaged in free work (Table 1).

Table 1: Sample demographic characteristics

Controlled variables	Levels	Groups				Chi value	Df	Sig. (P)	Statistical inference
		Control		Experimental					
		n	%	n	%				
Maternal age (years)	LT 20	17	12.5	13	9.5	.841	2	.657	The two groups are homogenous
	20-30	95	69.8	95	69.8				
	MT 30	24	17.6	28	20.5				
Mother's education	Illiterate	46	33.8	36	33.8	4.135	2	.126	The two groups are homogenous
	Moderate	88	64.7	93	68.3				
	University	2	1.4	7	5.1				
Mother's occupation	Housewife	136	100	136	100	.000	1	1.000	The two groups are homogenous
Husband's occupation	Laborers	49	36.0	49	36.3	.267	3	.966	The two groups are homogenous
	Officer	8	5.8	7	5.1				
	Free work	77	56.6	77	56.6				
	Others	2	1.4	3	2.2				
No. of children less than 5 years	Only one	43	31.6	52	38.2	1.427	3	.699	The two groups are homogenous
	Two	75	55.1	66	48.5				
	Three	15	11.0	15	11.0				
	Four	3	2.2	3	2.2				
Family size	Less than 9 members	114	83.8	114	83.8	.000	2	1.000	The two groups are homogenous
	9 - 13	18	13.2	18	13.2				
	More than 13	4	2.9	4	2.9				
Infant age (months)	LT 6	51	37.5	43	31.6	3.025	2	0.220	The two groups are homogenous
	6-12	51	37.5	46	33.8				
	MT 12	34	25.0	47	34.5				

There was no significant difference between the two study groups in the mothers' attitudes before and after applying the NEP (Table 2).

Table 2: Mother's attitudes in the two study groups

Variables	Group	Mean	SD	Calculated t-value	Df	Prob.	Statistical inference
Attitudes before applying nutrition educational program	B	44.9	44.59	1.180	270	0.239	The differences aren't significant
	A	44.3	44.45				
attitudes when applied (post-test measuring)	B	45.4	4.09	-5.975	270	.001	The NEP is efficient
	A	48.6	4.88				
t-test by pairs to determine the significance of effectiveness of NEP, in developing experimental group mother's attitudes	Pre	44.3	4.45	-7.296	135	.001	The NEP is efficient
	Post	48.6	4.88				

The t-test results to determine the significance of effectiveness of NEP in developing mothers' attitudes when applied at the Sennar Locality (post-test measuring), and developing experimental group mother's attitudes (comparing post-test with pre-test) showed an efficient effect for the program (Table 3).

Table 3: Effectiveness of (NEP) in developing mother's attitudes

Variables	T value= groups	Df	Effect size	Biserial correlation	% of explained variance	Inference concern the effect size
Attitudes post-test measuring	-5.975	270	0.117	0.342	11.68	Above medium
Comparing post-test with pre-test	-7.296	135	0.283	0.532	28.28	Large

The values and the magnitude of the effect of NEP on developing mothers' attitudes were assessed when applied at the Sennar Locality (post-test measuring) and (comparing post-test with pre-test). The nutrition education program has proven its effectiveness to be significant (Table 4).

The results showed that according to F values, there was no significant difference in the effectiveness of the NEP in developing attitudes among the mothers

Table 4: Nutrition educational program effectiveness in developing attitudes among experimental group mothers, according to mother's ages

Variables	Source	Sum of squares	Df	Mean square	F	Sig.
Maternal age	Between groups	33.606	2	16.803	0.350	0.706
	Within groups	6391.799	133	48.059		The differences are not significant
Mother's education	Between groups	13.688	3	4.563	0.094	0.963
	Within groups	6411.717	132	48.574		The differences are not significant
Husband's occupation	Between groups	13.688	3	4.563	0.094	0.963
	Within groups	6411.717	132	48.574		The differences are not significant
Number of children less than 5 years	Between groups	89.938	3	29.979	0.636	0.592
	Within groups	12,626.753	268	47.115		The differences are not significant
Child's age	Between groups	186.537	2	93.268	2.002	0.137
	Within groups	12,530.154	269	46.580		The differences are not significant

in the experimental group; according to husbands' occupations, the number of children less than 5 years, child's age, mother's education, and mother's age. According to Duncan test, the mean of attitudes improvement scores of mothers having a large family size is significantly lower than the other two means of mothers having small and medium family size (Table 5).

Table 5: Nutrition educational program effectiveness in developing attitudes among experimental group mother's, according to number of children less than 5 years

Variables	Source	Sum of squares	Df	Mean square	F	Sig
Attitudes improvement	Between groups	345.375	2	172.688	3.755	0.025
	Within groups	12,371.316	269	45.990		
	Total	12,716.691	271			

Discussion

To the best of the authors' knowledge, this is the first study tackled the assessment of a nutrition education program designed to enhance mothers' attitudes on infants and young child feeding in Sennar, Sudan. The main findings of the current study were the significance of the nutrition education program (NEP) in developing mothers' awareness when applied at the Sennar Locality (post-test measuring). Furthermore, the results illustrated that there was a statistically significant effect for the NEP in developing experimental group mothers' awareness (comparing post-test with pre-test) and the post-test measuring. Furthermore, the results showed that NEP significantly affects developing mothers' awareness when applied at the Sennar Locality (comparing post-test with pre-test).

For successful intervention programs to be replicated, it is essential to have a complete set of necessary data on implementation. In developing country settings similar to the current study, where the resources are limited, and community public health problems are prevalent, the implementation

and evaluation are essential for promoting effective programs, replication, and expansion [25]. The current intervention study is in line with a global focus on infant and young child nutrition [1]. Furthermore, infant and young child feeding is among the priority areas specified in the Sudan's National Nutrition Strategy [26].

Similar to the current study, researchers found that post-intervention increases in nutrition knowledge and good nutrition behavioral changes [27]. Another study showed that the awareness level of pregnant women about healthy nutrition has significantly increased from 3% prior the intervention to 31% after the nutritional education intervention ($p < 0.001$) [28]. Accordingly, there is sufficient evidence to support that nutritional education intervention positively affects respondents' nutritional awareness.

Apropos of that, the validity of the results revealed no significant differences between the two groups before applying NEP regarding mothers' practices such as breastfeeding, complementary feeding, and general and child feeding, t values = -0.767 , -1.535 , and 0.7031 , respectively.

As for the homogeneity of the two study groups, there were no significant differences with respect to the main variables; maternal age, mother's education, mother's occupation, husband's occupation, number of children less than 5 years, family size, and child's age, $p < 0.657$, 0.126 , 1.000 , 0.966 , 0.699 , 1.00 , and 0.220 , respectively. These results indicated that the two groups were homogenous.

The result showed no significant difference in nutrition educational program (NEP) effectiveness in developing awareness among the mothers in the experimental group, according to maternal age, mother's education, husband's occupation, number of children less than 5 years, and child's age followed by two post-tests within 3 weeks interval. In line with the present study, no correlation was evident between mothers' awareness of child health-related matters and the level of education, age, or the number of children [13].

The results of the current study revealed a correlation between the mothers' awareness of nutritional care of children after the implementation of the program and their educational level. Similarly, in Khartoum State, researchers reported that there was a strong correlation between high illiteracy and low income with the knowledge, attitudes, and practices of the mother toward exclusive breastfeeding [29].

Although this is the first study of this kind in Sennar, some limitations should be noted. The sampling of the participants was based on home visits; 10 health workers were employed to help in the initial data collection (house visit). During program implementation, mothers were motivated to participate. Potential risks may arise due to a lack of double blinding. Parents of the study children and the nutrition counselors allocated to the intervention group may be aware of the allocated arm.

It is highly recommended to focus on nutritional education programs to raise mothers' awareness about childcare and feeding to be implemented in other states in Sudan. The government should support the nutrition education program sector for integrated health packages and should ensure the proper functioning of nutritional health programs and health workers. Good NEPs integrate government ministries (health and education) to introduce a section on infant and young children feeding in the nutrition at higher secondary level to promote knowledge and awareness in this aspect.

Conclusion

The results indicated the effectiveness of NEP in developing mother's attitudes and improving their awareness. The intervention components can feasibly be integrated into existing health services in different areas in Sennar. If successful, the approach used to deliver the nutrition education package could be quickly and inexpensively scaled and disseminated in other parts of Sudan.

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Authors' Contributions

E.M. designed the study and recruited the participants. E.M., A.G., and M.E. analyzed the data and wrote the manuscript. Z.T. contributed to the design of the study, data collection, and manuscript writing. All contributive authors of this original manuscript authorized the final version of the manuscript. All authors have read and approved the final manuscript.

Ethical Approval

Ethical approval was obtained from the Ethical Committee, Federal Ministry of Health, Sennar State. Additional clearance was obtained from the local health authorities and locality.

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