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Research Article Nutrition Education to Improve Nutrition Knowledge, Attitude and Practice among Yemeni School Children

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Abstract

Background and Objective: Yemen is the second poorest country in the Middle East and North African region. Yemenis also face serious nutrition problems, mainly due to low-quality food intake, which may affect their development. The aim of this study was to investigate the effects of a nutrition education package on Knowledge, Attitude and Practice (KAP) related to nutrition among Yemeni primary school children. **Materials and Methods:** An experimental study design with pre and post-test was carried out. A validated questionnaire was used to assess KAP. A total of 233 children in the age of 8 were divided into an intervention group (105) and a control group (128). The intervention group received a nutrition education package, which encompassed of video and comic book sessions, while the control group received only formal education at school. **Results:** The nutritional knowledge mean score doubled for the intervention group at post-intervention. Moreover, the nutrition attitude and the nutrition practice mean scores increased at post-test for the intervention group's at pre and post-intervention (p<0.05), while no significant mean difference was detected in the control group. Moreover, the changes in the scores for knowledge (F = 24.84, p<0.05), attitude (F = 6.44, p<0.05) and practice (F = 24.03, p<0.05) in the intervention group were maintained even after adjusting for confounding factors. **Conclusion:** The nutrition education package utilized in this study is probable as the intervention tool to combat malnutrition among Yemeni school children.

Key words: Primary school children, nutrition education, nutrition knowledge, nutrition attitude, nutrition practice, malnutrition

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Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Being the second poorest country in the Middle East and North Africa region, Yemen is burdened with substantial problems such as; poverty, ill-health, malnutrition and low educational achievement due to the high population growth (estimated at 3.5% in 2006)¹. Malnutrition is common and remains a major public health concern among school children in different parts of Yemen, indicating a need for meaningful intervention²⁻⁷.

Although, several interventions have been organized in the past to curb malnutrition in Yemen, a majority of these attempts targeted solely on children below the age of five and mothers. Other efforts were made to manage nutritional problems among school children via de-worming or supplementation, particularly in urban areas. School children, in the rural areas were given rations to share with their family members⁵. One of the programmes that targeted school children in Yemen was School Health and Nutrition (SHN) programme. It was initiated in the year 2008 to promote good health and good nutrition for effective education among school children. This programme was implemented together with other programmes supported by the World Food Programme (WFP). Both programmes targeted 400,000 school children in the most food-insecure regions and their improvement was expected to be assessed in the year 2011. Unfortunately, most of the programmes were not evaluated due to the Arab Spring in 2010s⁸. From 2011, the situation in Yemen was politically unstable with a shortage of fuel and an increment in fuel price, instability in the supply of electricity as well as increasing poverty levels with household food insecurity reaching a strikingly high level. The situation in Yemen deteriorated more with conflicts in all the areas of Yemen since 26th March, 2015. Indeed, 21.1 million people, including 9.9 million children were in need of humanitarian assistance in 2015. UNICEF and other NGOs had declared Level-4 emergency and this state of emergency persists up to date⁹.

Nutrition education is essential for fostering healthy dietary habits among school children. Although, health education is not a core subject in the schools curriculum in Yemen, aspects of health education are incorporated into other subjects such as; Science, Arabic reading, Islamic studies, English and others¹⁰. Of note, topics on nutrition were included among the health education subjects in Yemeni school's curriculum. However, according to the FAO¹¹ guidelines, nutrition education among primary school children in Yemen is poor and has led to lack of proper nutrition knowledge, inappropriate good hygiene practice and

inaccurate dietary practices among school children. Nutrition education is, therefore, an unmet need for school children in Yemen. This study was conducted to investigate the effects of a nutrition education package on Knowledge, Attitude and Practice (KAP) related to nutrition among Yemeni primary school children.

MATERIALS AND METHODS

Ethics: Ethical approval was obtained from the Medical Council (Republic of Yemen) to conduct the study (Reference No. 84521). Permission was also sought out from the Ministry of Education, school administration and Yemen cultural attached in Kuala Lumpur, Malaysia. Written consent from the parents and verbal consent of the children were obtained before the intervention.

Study design: An experimental study design with pre and post-test was carried out. Although, the study was initially planned to be carried out in Yemen due to political instability and acceleration of conflict in March, 2015. This study was conducted in Malaysia among Yemeni schools International Modern Arabic School (IMAS) and Yemeni School Serdang (YSS) in the months of July-April, 2016.

Sampling and subjects: International Modern Arabic School (IMAS) and Yemeni School Serdang (YSS) were selected purposefully for this study, because this is the only two Yemeni schools in Malaysia, where the Yemeni children receive their education. The majority of studies on the effectiveness of the nutrition education programme were conducted involving the 2 schools¹²⁻¹⁷.

For this experimental study, 233 eight-year-old children were randomly selected from two Yemeni schools (IMAS and YSS) in Malaysia. For inclusion in this study, the child must be Yemeni, eight years old, in the 3rd grade and had no health issues. All children were approximately eight years of age. This age group was selected for this intervention, because children at this age are susceptible towards the application of the programme for changing their eating habits and practice. The first and second-grade school children are new to the different environment of the school, thus, they may need more time to adapt to it. In addition, they are still trying to read and comprehend lessons¹⁸.

Intervention components: Intervention components utilized in this study encompassed a video and a comic book. Considering no nutritional education programme is utilized in Yemen and that Yemen has the same social and cultural context as Malaysia¹⁹, the education package used in this study was adapted from Ruzita *et al.*¹². The video used in the original study was in Malay language. To accommodate the subjects who are native Arabic speakers, another video was adapted from the Republic of Tunisia. The video was sponsored by The United Nation and was applied as a learning tool by the National Consumer Institute²⁰ in primary schools and the kindergartens in the Republic of Tunisia. Meanwhile, the comic book was adapted from a study carried out by Wan Azdie²¹. The comic book was translated into the Arabic language by an official Yemeni translator and included coloured pictures drawn by a Yemeni artist.

Study instrument: A questionnaire evaluating the nutrition Knowledge, Attitude and Practice (KAP) on nutrition was adapted from a previous study²¹. The guestionnaire consisted of 27 items in the knowledge domain, 8 items in the attitude domain and 15 items in the practice domain. The questionnaire was pilot-tested with the reliability test indicating a Cronbach's alpha of 0.89, 0.77 and 0.74 for knowledge, attitude and practice domains, respectively. The guestionnaire was given to all participants before the nutrition education programme was delivered to the intervention group to obtain pre-test scores. Then, at the end of the 4th week programme, the guestionnaire was re-administered to all of the participants to obtain post-test scores. Correct responses were expressed in percentage. Participants with scores <50% were classified as poor achievers, whilst those with scores ranging 50-70% were classified as fair achievers and those with scores >70% were considered as good achievers^{12,22}. Improvement in KAP scores at post-test was the main outcome measure used to assess the effectiveness of the nutrition education programme.

Data collection procedure: Data collection started on 5th April, 2016, involving 244 children from both schools. Grade 3 children in IMAS school were labelled as the intervention group (n = 112) and grade 3 children in YSS were labelled as the control group (n = 132). Only 233 students were included in the final analysis because some of the children were unable to attend all the sessions or were absent during the post-test.

Intervention programme started on 25th April, 2016 and 112 children in IMAS School attended the classroom during the sports class and were showed a video on the food pyramid that took about 4.23 min. The children were then asked to answer questions pertaining to the video session. During the 2nd week, 108 children were given the comic book and were asked to read it carefully. They could ask their teacher or the researcher as well as the assistant, for clarification. On the 3rd week, the children (108) were given several tasks to be done in a group. Each group consisting of 4-5 children was asked to draw the healthy diet on a food pyramid model using information provided in the video and comic book. In addition, children were asked to identify the food groups brought by the researcher. The activities lasted for 2 h. The control group in YSS received only the nutrition information provided in their curriculum. During the 4th week, both groups were given the KAP questionnaire again. The intervention and control group consisted of 105 and 128 children, respectively.

Data analysis: Quantitative data was cleaned and analyzed by using SPSS version 20 for Windows 10. Parametric statistics were applied to the data because the data was normally distributed. Descriptive statistics including; frequencies, percentages, means and standard deviation (\pm SD) were used to describe and summarize the distribution of data related to nutritional KAP scores. Overall nutritional KAP scores were recorded and classified to poor, fair and good categories. Significance of the results was determined at 95% confidence interval. Pearson correlation was also used to establish the relationship between nutrition knowledge, attitude and practice. General Linear Model (GLM) univariate procedure was utilized to examine the change in KAP scores from pre to post-intervention between the intervention and control groups with potentially confounding factors (weight-for-age, mother's education and parent's employment) included as covariate.

RESULTS

Demographic and socioeconomic profile: The demographic and socioeconomic profile of the participants are shown in Table 1. Total 71.4 and 50.8% of the fathers (intervention and control group) were in the age group of 40-49 years, while 77.1 and 82% of mothers were in the age category of 30-39 years. The majority (65.7 and 66.4%) of the fathers from both groups were educated and had a diploma/university degree. Similarly, the majority (80 and 58.6%) of the mothers from both groups possessed a diploma/university degree. For the income, the majority of fathers (65.7% in the intervention group and 78.9% in the control group) earned 300-599 USD per month as presented in Table 1.

Nutrition knowledge, attitude and practice before and after nutrition education program: Means differences in the knowledge, attitude and practice scores between the groups

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Table 1: Demographic and socioeconomic profile (n = 233)

Characteristics	Intervention group (105) n (%)	Control group (128) n (%)	Chi-square
Gender (233)			
Male	51 (48.6)	70 (54.7)	$\chi^2 = 0.86, p = 0.35$
Female	54 (51.4)	58 (45.3)	
*Age (Father)			
30-39	30 (28.6)	63 (49.2)	$\chi^2 = 29.01, p = 0.00^*$
40-49	75 (71.4)	65 (50.8)	
[#] Age (Mother)			
19-29	24 (22.9)	23 (18.0)	$\chi^2 = 13.61, p = 0.09$
30-39	81 (77.1)	105 (82.0)	
Father education			
Illiterate	13 (12.4)	15 (11.7)	$\chi^2 = 5.42, p = 0.14$
Primary and secondary schooling	23 (21.9)	28 (21.9)	
Diploma/University	69 (65.7)	85 (66.4)	
Mother education			
Illiterate	0 (00.0)	0 (00.0)	$\chi^2 = 36.7, p = 0.00^*$
Primary and secondary schooling	21 (20.0)	53 (41.4)	
Diploma/University	84 (80.0)	75 (58.6)	
Father income (USD)			
300-599	69 (65.7)	101 (78.9)	$\chi^2 = 5.15, p = 0.07$
600->1000	36 (34.3)	27 (21.1)	
Weight-for-age			
<-2 SD	4(3.9)	4 (3.1)	$\chi^2 = 1.32, p = 0.857$
>-2 SD	101 (96.1)	124 (96.9)	
Height-for-age			
<-2 SD	0 (00.0)	1 (0.8)	$\chi^2 = 1.36$, p = 0.504
>-2 SD	105 (100.0)	127 (99.2)	
Weight-for-height			
<-2 SD	4 (3.8)	6 (4.7)	$\chi^2 = 2.14, p = 0.827$
>-2 SD	101(96.2)	122 (95.3)	

1USD: 4.10 Rm, *p<0.05, χ^2 = chi-square, *0 ppl were for other age ranges, <-2 SD: Underweight (weight-for-age), stunting (height-for-age), wasting (weight-for-height), >-2 SD or -2 SD

Table 2: Means differences in l	nowledge, attitude and	practice among i	intervention and c	ontrol groups ($n = 233$)
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Factors (%)	Intervention group (mean±SD)	Control group (mean±SD)
Nutrition knowledge		
Pre-test	20.7±6.2*	25.1±10.1
Post-test	46.1±4.9*	25.2±8.5
Means difference (p-value)	25.4**	0.1
Nutrition attitude		
Pre-test	8.4±4.6*	12.8±2.5
Post-test	12.3±4.5*	11.1±2.9
Means difference (p-value)	3.9**	-1.7
Nutrition practice		
Pre-test	15.4±4.4*	17.9±4.3
Post-test	18.2±4.1*	15.2±3.4
Means difference (p-value)	2.8**	-2.7

*Significantly different between intervention and control groups (independent t-test), **Significantly different between pre-test and post-test within group (paired t-test)

are shown in Table 2. The mean scores of knowledge on nutrition for both groups were 20.7 ± 6.2 and 25.1 ± 10.1 , respectively, at pre-intervention. Post-intervention, the mean score of knowledge on nutrition for intervention group was 46.1 ± 4.9 . The improvement in the nutrition knowledge among the participants in the intervention group almost

doubled at post-test (20.7 ± 6.2 -46.1 ± 4.9). However, there was no difference in the mean score from pre-test to post-test in the control group (Table 2).

Pre-intervention, the mean scores for attitude domain were 8.4 ± 4.6 and 12.8 ± 2.5 in the intervention and control groups, respectively. The mean scores for nutrition attitude

intervention and control groups (in 255)			
Factors	F-value (%)	p-value	
Knowledge	24.84	0.000	
Attitude	6.44	0.012	
Practice	24.03	0.000	

Table 3: Mean changes^a in nutrition knowledge, attitude and practice among intervention and control groups (n = 233)

^aAdjusted for weight-for-age of the children, mother education and parental employment

were 12.3 ± 4.5 and 11.1 ± 2.9 in the intervention and control groups, respectively, after intervention.

Regarding the nutrition practice, the mean scores of 15.4 ± 4.4 and 17.9 ± 4.3 , respectively were recorded at pre-intervention, but in the post-intervention, the mean scores for the intervention group improved to 18.2 ± 4.1 . Whereas, the control group showed a reduction in the mean score.

There were significant differences in the mean KAP score between the intervention and the control groups at both pre and post-intervention. ANCOVA (analysis of covariance) was performed and p-value remained significant in the pre-test among participants in both intervention and control groups.

Overall changes in nutrition knowledge, attitude and practice: Table 3 shows the mean difference in knowledge, attitude and practice scores between the intervention and the control groups. There was a significant difference in the mean scores of knowledge, attitude and practice between the 2 groups. This difference persisted even after adjusting weight-for-age of the children, mother's education level and parental employment (Table 3).

DISCUSSION

Nutrition education package utilized in this study seems to be effective in terms of overall improvement in nutrition knowledge, attitude and practice mean scores among the intervention group. Therefore, school-based nutrition education is one of the promising interventions that could improve the lifestyle of the children and community as whole²³.

After intervention, knowledge on nutrition improved greatly among the participants in the intervention group as compared to the attitude and the practice. However, significant increases could only be noticed among the intervention group. It should be noted that nutrition knowledge in the control group showed some improvement at post-test, possibly due to sensitization that occurred during the first exposure to the questionnaire and recalling of answers from the first test^{24,25}.

The greater improvement in the nutrition knowledge among the intervention group may also be related to the repetition of the information during the first 2 weeks of the education programme, because the information provided in the video was the same as that provided in the comic book by Shiffrin and Schneider²⁶, who pointed out that knowledge remains longer in the memory after repetition according to the information processing theory. Generally, an improvement in knowledge was reported in the majority of studies that used a nutrition education programme, but the increment in knowledge differs from one study to another²⁷. These differences are related to the duration of the intervention and the method(s) used to deliver the intervention. The findings of this study supported those of Gitau *et al.*²⁸ in Kenya.

Overall improvement in mean scores of nutrition attitude was seen among the participants in the intervention group in this study and this was in agreement with the studies by Kostanjevec *et al.*²⁹ and Anonymous³⁰. Similar to attitude, the mean score for the nutrition practice also showed an improvement among the participants in the intervention group, consistent with previous reports from Kigaru *et al.*¹⁵ and Nekesa³¹ in Kenya.

This study showed significant differences in overall mean score for Knowledge, Attitude and Practice (KAP) at both pre and post-test among both intervention and control groups and the significant difference was maintained even after adjusting the confounding factors. This is contrary to the findings from Gitau *et al.*²⁸ in Kenya, Shariff *et al.*¹³ in Malaysia, Kostanjevec *et al.*²⁹ in Slovenia and Vardanjani *et al.*³² in Iran. They reported significant differences in the means between 2 groups (intervention and control) in the post-test only, while no significant mean difference was observed at pretest.

Despite some limitations that were related to the duration of the study, human resources and the war in Yemen, an improvement was seen for KAP after intervention with nutrition education programme. Therefore, it is recommended that a long-term nutrition education intervention should be included in the school curriculum as a separate subject. Nutrition education should cover topics related to establishing a healthy eating pattern, because nutrition habits practiced at a young age are difficult to change later in life³³. Moreover, addressing factors related to families such as; the parent's level of education is equally important to ameliorate the effectiveness of a nutrition education programme. Parent's influence on food choices among children should be studied³⁴. Further studies are also needed on the relationship between food marketing and child nutrition and health³⁵. It is also important that families, schools, society, the government and the food industries collaborate to establish healthier nutritional behavior among children.

CONCLUSION

The novel outcome of this study is that the nutrition education package utilized over a period of four weeks seems to be effective in terms of improving nutrition knowledge, attitude and practice, because the intervention group showed improvement in all the three domains. Indeed, utilizing videos and comic books as education media assisted in attracting children's attention and resulted in better understanding among children.

SIGNIFICANCE STATEMENT

This study discovers the possibility of implementing a nutrition education programme among school children to combat malnutrition in Aden, Yemen. This study will help the researcher to uncover the critical area of nutrition education intervention as simple and cost-effective health and nutrition interventions have not been studied yet in Yemen. Thus, a new theory on implementing a nutrition education programme among school children to combat malnutrition may be reached.

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