

Effectiveness of Eat the Rainbow Nutrition Education Intervention on Knowledge and Practice Regarding Inclusion of Fruits and Vegetables in the Diet among School Children

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Abstract

Introduction: Good nutrition is very important for the Children's development-mentally and physically. According to the Dietary Guidelines for Americans (DGAs) it is said that consumption of-fruits and vegetables focus on health promotion, disease risk reduction and prevention of chronic diseases. To obtain all the nutrients needed for our bodies' different coloured fruits and vegetables must be included every day in the diet. "Eat the Rainbow intervention programme" is about eating many fruits and vegetables of many different colours every day, which offer different nutrients to the body.

Objectives: To assess the effectiveness of eat the rainbow nutrition education intervention among school children on the knowledge and practice regarding inclusion of fruits and vegetables in the diet among school children.

Methodology: One group pre-test post-test design was adopted to assess the effectiveness of eat the rainbow nutrition education intervention" on knowledge and practice regarding inclusion of fruits and vegetables in the diet among 60 school children of 8-10 years. Structured knowledge questionnaire, practice structured food dairy were used to collect the data from the school children.

Results: The findings revealed in pre-test 73.3% had average knowledge, 58.3% had inadequate practice regarding inclusion of fruits, and vegetables whereas in post-test 95% had adequate knowledge and 93.3% had moderate practice. There is a statistical significant improvement in the level of knowledge and practice after "eat the rainbow nutrition education intervention. The finding revealed that eat the rainbow nutrition education intervention was effective.

Keywords: Effectiveness; Eat the rainbow nutrition education intervention; Knowledge; Practice; School children

Introduction

School children are the future generation of tomorrow, according to UNICEF, age group of 6 to 12 years are considered as the School-age children [1]. They have a consistent but slow rate of growth and usually eat four to five times a day including snacks. Maintaining their health, growth and development is very important during this age group. These age group children face rapid development-mentally and physically, thus good nutrition is very important at this phase of life. The eating habits in children developed at birth are generally continued into adulthood. The food choices influence the eating habits. Many food habits, likes, and dislikes are established during this time. Family, friends, and the media especially TV influence their food choices and eating habits [2].

Nutrition is the process of taking of adequate amount of nutrients from the foods we eat. Also, it is the building blocks of life as it uses food for growth, repair and maintaining of the body. The essential nutrients for life include carbohydrates, proteins, lipids, fiber, vitamins, minerals and water-the solvent of all ingredients in the blood and cells [3].

According to the reports there are number of factors that influence the dietary choices, pattern and practices of individuals such as food accessibility, food characteristics, environmental and psychological influences [2].

Similarly, changes in the dietary pattern towards frequent snacking, eating dense foods and sweetened beverages that is away from home food leads to consumption, of high energy low nutrients that have implicated to childhood obesity. This childhood obesity also track into adulthood and increase the risk for later development of chronic diseases such as

coronary heart disease, high blood pressure, diabetes, hyperlipidemia and various type of cancer. The food selection and consumption also affect the general health status [4].

Good nutrition means getting the right amount of nutrients from healthy food in the right combinations. Proper nutrition helps in developing and maintaining good health, cause being healthy not only makes us feel great, but also enable us to enjoy life to our fullest potential and follow our dreams [5].

According to WHO "health is a state of complete physical, mental, social and spiritual wellbeing and not merely the absence of diseases or infirmity [6]. Several government agencies have published recommendation for an adequate diet, which focuses on obtaining ample calories, vitamins and minerals to support growth and a healthy life through everyday consumption of healthy foods [7].

The Dietary Guidelines for Americans encourage the consumption

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of fruits and vegetables that focus on health promotion and disease risk reduction. Meeting the daily fruits and vegetables recommendations is beneficial in preventing chronic diseases, because they are nutrient-dense, high in fibres and low in energy density. Consuming the suggested amount of fruits and vegetables will provide an assortment of micronutrients and fibres, which promote good health and assist in preventing chronic diseases [8].

There is compelling scientific evidence that a diet rich in fruits and vegetables is associated with multiple health benefits. A substantial amount of scientific evidence shows that high fruit and vegetable intake can reduce the risk of e.g. cancer, cardiovascular diseases, diabetes, cavity and may protect against a range of childhood illnesses such as respiratory symptoms [7].

Dietary Guidelines and the Food Guide Pyramid recommend eating five or more servings of fruits and vegetables per day (US Department of Agriculture, 2010). According to the Ministry of Health Malaysia the recommended intake of fruits and vegetables is five servings (approximately 400 g) which are two servings for fruits and three servings for vegetables per day, 2010). The health benefits of fruits and vegetables seen in epidemiological studies are the main reasons for the recommended intake of at least 400 g of fruit and vegetables per day [9].

Having nutritional knowledge and making smart choices about the foods we eat can help the children to achieve optimum health over lifetime, and be a key to avoid obesity, illness and most prevalent chronic disease. And thus, health promotion from the early stage in life by fostering healthy eating practices and regular physical activity has the potential for a major impact on health and wellbeing during childhood and in the later stages of life as well [10].

“Eat the Rainbow” is a teaching programme designed for the children in order to, encouraging the children to include fruits and vegetables in their everyday diet, So that to obtain all the nutrients needed for their bodies.

Hence based on the above statistics and findings, the study on the “effectiveness of Eat the rainbow nutrition education intervention” on knowledge and practice regarding inclusion of fruits and vegetables in the diet among school children in selected school was undertaken to improve the knowledge and practice among the children . The main aim of the study is to assess the knowledge and practice regarding inclusion of fruits and vegetables in the diet among school children before and after eat the rainbow nutrition education intervention among school children.

Materials and Methods

A pre-experiment design with one group pre-test post-test design to assess the effectiveness of the eat the rainbow nutrition education intervention on knowledge and practice regarding inclusion of fruits and vegetables in the diet among school children was carried at Primary School, Bengaluru.

After extrinsic review and obtaining Opinions from the experts the tools for data collection were developed .The investigator ensured that pretesting, reliability and content validity were obtained prior to the data collection. The constructed tools consist three sections:

- Socio-demographic variables which had 10 items- age, gender, religion, educational status, educational status of mother, educational status of father, occupational status of mother, occupational status of father, family income and dietary pattern.

- Structured knowledge questionnaire regarding inclusion of fruits and vegetables in the diet among school children consisted of 10 items. Every “right” answer was awarded a score of “1” and every wrong answer was awarded a score of “0”. Thus a total of 10 marks were given for knowledge questionnaire.

To interpret the level of knowledge, the scores were distributed as follows:

- Maximum score =10
- Inadequate knowledge: <50% (>5)
- Moderate knowledge: 50-75% (5-7)
- Adequate knowledge: >75% (>7)

- Structured food diary is a chart used to track inclusion of fruits and vegetables in the diet over the week. The structured food diary consisted of 5 tables that are from Monday to Friday that include breakfast, morning snack, lunch, afternoon snack, dinner and bedtime snack.

The list of all the fruits and vegetables consumed by the school children were grouped into 5 different colours (red, yellow/orange, green, blue/purple and white). And total of daily frequency of consumption of fruits and vegetables were calculated from the structured food diary by summarizing the consumption per day for each item and was scored as follows:

Interpretation of score

The total score of fruits and vegetables was calculated by adding all the fruits and vegetables consumes by the school children in all 5 days of the week. A total of 10 score was awarded for vegetables and fruits respectively, the scores were distributed as follows Table 1:

Maximum score was 10 for fruits and 10 for vegetables.

- <5 (< 50%) =Inadequate practice.
- 5-7 (50-75%) =Moderate practice.
- >7 (>75%) =Adequate practice.

“Eat the rainbow nutrition education intervention”

“Eat the rainbow nutrition education intervention” was formulated comprehensively into two sessions for consequently two days. The details as follows Table 2:

Formal permission was obtained from the concerned authority from the Primary School. 60 school children in the age group of 8-10yrs, studying in grade III and IV were recruited for the study based on the selection criteria using convenient sampling technique the subject who fulfilled the inclusion criteria were selected by using convenient sampling technique. Data collection was conducted during the month of March 2017. Researcher introduces herself to the school children and the purpose of the study was explained. The consent and invitation to attend the “eat the rainbow nutrition education intervention” was sent to the parents, those school children who brought back the consent form from the parents were asked to filled the assent form. After collecting the assent form, the data collection was carried out in the following manners:

	Fruits			Vegetables		
Consumption	2	1	NO	4-5	3-2	1/ NO
Score	2	1	0	2	1	0

Table 1: A total of 10 score was awarded for vegetables and fruits.

Day	Session	Topic	AV-Aids	duration
1	Session 1	Introduced and discussed two colours fruits and vegetables [red and yellow/orange] a) Playing the rainbow song	PPT	10 minutes
			Video	5 minutes
2	Session 2	a) Introduced and discussed the other three colours of fruits and vegetables [green, purple/blue and white/brown] b) Song and skit c) Match the following and painting	PPT	15 minutes
			Video and role play	15 minutes
				20 minutes

Table 2: Eat the rainbow nutrition education intervention was formulated comprehensively into two sessions.

Day 1 Pre-test:

- The school children were made to assemble in the Audio Visual Aids room.
- The purpose of the study was explained.
- The student researcher gave instruction to the school children regarding the tool and asked them to put a tick mark for knowledge questionnaire of whatever they feel is the correct answer.
- The structured knowledge questionnaire was administered.
- Each student took approximately 20-25 minutes to complete the questionnaire.
- After receiving the structured knowledge questionnaires, the school children was administered with the structured food dairy regarding inclusion of fruits and vegetables in the diet and was instructed to filled each column (from Monday to Friday) everyday with the help of the mother/ parents, and report it to the student researcher every day for 5 days.
- The tool was collected on the end of the 5th day (i.e. on Saturday).

Intervention: The intervention was carried out in two sessions for two consecutive days.

Day 1: 60 school children along with their parents were assemble in the AV Aids room, the investigator introduce herself and discussed regarding the importance and benefits of inclusion of fruits and vegetables in the diet , followed by a video show, the session last for 50-60minutes.

Day 2: On the 2nd day, revision of all the 5 colours of fruits and vegetables regarding their importance and benefits was done, after that match the following and painting of fruits and vegetables was done, followed by skit and action song. And at the end of the session fruits were distributed to all the 60 school children, the session last for 80-90 minutes.

Post-test: The school children were given the post-test knowledge and practice food diary on the 16th day. The knowledge questionnaire was immediately collected after they finished answering, whereas the structured food dairy was collected at the end of the 5th day. The student researcher assured that every day the school children fills the practice tool. The data were analysed using descriptive and inferential statistics. The institutional ethical committee approved this study.

Results

Tables 3 and 3.1 shows the Socio-demographic variables of the school children. More than half 60% of the school children were 9 years of age. Half of school children 58.3% were females. Majority of the children were from Hindu family. 30% of the children's mother educational status and 40% of the father's education were graduates.

Sl. no	Socio-demographic variables	Frequency (f)	Percentage (%)
1	Age (years)		
	8	16	27.7
	9	36	60
2	Gender		
	Male	25	41.7
	Female	35	58.3
3	Religion		
	Hindu	46	76.6
	Muslim	8	13.3
4	Diet pattern		
	Vegetarian	16	26.7
	Non- vegetarian	44	73.3
5	Family income (per month)		
	10,000-40,000	43	71.7
	41,000-80,000	17	28.3

Table 3: Frequency and Percentage distribution of socio demographic variable of the school children n=60.

Knowledge of the school children

In the pre-test, knowledge regarding inclusion of fruit and vegetable among the school children was inadequate 44 (73.3) and the level of knowledge increased significantly after post-test with 57 (95%) of the school children had adequate and it was also found significant at $p < 0.001$ with the 't' value of 25.324 (Tables 4 and 5).

Fruits practices

The study found that in the pre-test 35 (58.3%) of school children had inadequate practice whereas after the intervention 43 (71.7%) of the school children had fruits in their diet. Statistically significant changes in the inclusion of fruit in their diet was found significant at $p < 0.001$ with 't' value 5.443 (Tables 4 and 5).

Vegetable practices

In the pre-test 43 (71.7%) had inadequate practice of inclusion of fruit in the diet and in the post-test 56(93.3) of the school children had included vegetable in their diet moderately. However, there was a significant increase in the inclusion of the vegetable in diet. The statistical analysis showed that it was significant at $p < 0.002$ with 't' value 11.427 (Tables 4 and 5).

Regarding the association of knowledge regarding inclusion of fruit and vegetable in diet the finding revealed that there is no significant association found between knowledge and socioeconomic variable. However, with regards to education of the father and occupation of mother had significant association.

Sl. No	Socio-demographic data	Frequency (f)	Percentage (%)
1	Educational status of mother		
	No formal education	5	8.3
	Primary education (1-6 standard)	3	5
	Secondary education (7-10 standard)	11	18.3
	Higher secondary education/PUC	17	28.3
	Graduation	18	30
	Post-graduation	6	10
2	Educational status of father		
	No formal education	4	6.7
	Primary education (1-6 standard)	1	1.7
	Secondary education (7-10 standard)	8	13.3
	Higher secondary education/PUC	10	16.7
	Graduation	24	40
	Post-graduation	13	21.7
3	Occupation of mother		
	Home maker	43	71.7
	Self-employed	3	5
	Government employee	8	13.3
	Private employee	6	10
4	Occupation of father		
	Self-employed	25	41.7
	Government employee	7	11.7
	Private employee	28	46.7

Table 3.1: Frequency and Percentage distribution of socio-demographic variables of school children according to the education status and occupation of father and mother (n=60).

Sl. No	Level	Knowledge		Fruit practice		Vegetable practice	
		Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
1	Inadequate (<50%)	44(73.3)	0	35 (58.3)	0	43 (71.7)	1 (1.7)
2	Moderate (50-75 %)	15(25)	3(5)	15 (25)	17 (28.3)	17 (28.3)	56 (93.3)
3	Adequate (75%)	1(1.7)	57(95)	10 (16.7)	43 (71.7)	0	3(5.0)

Table 4: Frequency and percentage distribution of the level of knowledge, fruits and vegetable practice before and after administration of "eat the rainbow nutrition education intervention" (n=60).

Sl. No	Variables	Pre-test	Post-test	Mean	SD	"t" value	P value
1	Level of knowledge	Pre-test		1.73	0.446	25.324	<0.001 S*
		Post-test		2.95	0.220		
2	Level of fruits practice	Pre-test		1.58	0.766	5.443	<0.001 S*
		Post-test		2.22	0.783		
3	Level of vegetables practice	Pre-test		1.28	0.454	11.427	<0.0002 S*
		Post-test		2.03	0.258		

Table 5: Mean and standard deviation of "effectiveness of eat the rainbow nutrition education intervention" on knowledge and practice regarding inclusion of fruits and Vegetables in the diet (n=60).

Discussion

Eat the rainbow nutrition education intervention is an important programme to be included in the schools which play a significant role in promoting the healthy life style among school children. According to the school health, guidelines healthy eating and regular physical activity play a substantial role in preventing chronic diseases. Multiple factors including demographic, personal and environmental factors influence the eating behaviour of children [11]. Therefore, it is necessary to educate the children and impart them with healthy eating habits during the early school age.

In this study eat the rainbow nutrition education intervention was effective in enhancing the knowledge regarding the inclusion of fruits and vegetable in the diet as well as changes in the intake of fruits and vegetable. This study also found significant difference in the knowledge and inclusion of fruits and vegetables in the diet. Similarly, a study conducted in elementary school to test difference on mean fruit and vegetable eaten, liking, preference and self-efficacy scores denoted that there was a significant difference in the intervention group as well as between the pre and post- test intervention [12].

The study result shows that the nutrition education intervention with colour fruits and vegetables is an effective method of teaching in improving the intake of fruits and vegetable in the diet.

Conclusion

This study concludes that a well-planned teaching program improves the knowledge among school children and including various methods of teaching and activities enhances the knowledge and attract the school children's to learn. Implementing similar program at various settings and among different age group children can improve the eating habits among the children.

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