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Effect of a Nutrition Education Program on Nutritional knowledge and Dietary behaviour of Children in the Age Group of 7 to 9 Years

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Abstract

Globalization has brought significant lifestyle changes in the population. Much of this enormous burden is already evident in urban as well as semi-urban population across India. The underlying determinants for chronic non-communicable diseases are socio behavioural factors such as improper diet, stress, physical inactivity and smoking, all of which can be modified with sound nutrition education programmes. Unhealthy eating practices that contribute to chronic disease are established early in life; children having unhealthy eating habits tend to maintain these habits as they age. Schools are ideal settings for nutrition education. The intensity and quality of nutrition messages students are receiving is not adequate to help them make wise choices of healthy food.

Two private co-education schools in Chennai Central Zone were chosen. Selection of the schools was purposeful. Solomon's four group design was used for the present study. All students in class 3 and 4 who were in the age range of 7-9 years were invited to participate. Written consent was collected from parents/guardians. The intervention material was developed based on Social Cognitive Theory. Two sessions per week were conducted for a period of three months.

As the sample for the present study happened to be children of 7 to 9 years, there was no significant gender difference on nutritional status at the beginning of the study. Children in experimental groups 1 and 2 had significantly better nutrition knowledge than those who were in control groups 1 and 2. Multiple group comparison in pairs filtered the effects of other extraneous factors such as maturation, history of occurrence of any other significant event etc on the dependent variable measure namely nutrition knowledge and dietary behavior. The study highlights the importance of nutrition education to improve the nutritional knowledge and dietary behavior of children aged 7-9 years.

Keywords: nutrition education, dietary behaviour, nutritional knowledge

Introduction

Rapid socioeconomic advancements in India in the recent decades have brought significant lifestyle changes in the population. With the purchasing power of the middle income group increasing and the tremendous impact of advertising coupled with easy availability of junk foods, bakery products and processed foods on the shelves of all super markets, the consumer is tempted, confused and often misled. The soft targets are always children. The most disturbing and harmful effect of globalization to people and the nation as a whole is this drift away from a healthy choice of food and dietary habits. Studies have constantly shown increased consumption of fats and oils, decreased intake of complex carbohydrates, eating out and skipping meals. This unhealthy lifestyle is a major health problem (Campbell and Hesketh, 2007) [3].

Much of this enormous burden is already evident in urban as well as semi-urban population across India. At the present stage of India's health transition, an estimated 53 percent of the deaths and 44% of the disability during productive years are contributed to chronic non-communicable disease (Chitra and Reddy, 2007) [4]. India also has the largest number of people with diabetes in the world, with an estimated 40.9 million in 2007 and projected 57.2 million in 2025 (Diabetes Atlas, 2007).

The underlying determinants for the chronic non-communicable diseases are behavioural factors such as improper diet, stress, physical inactivity and smoking (Raj, Sundaram, Paul, Sudhakar and Kumar, 2009) [8]. All of which can be modified with sound nutrition education programmes.

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Unhealthy eating practices that contribute to chronic disease are established early in life; young person's having unhealthy eating habits tend to maintain these habits as they age (Priyali Shah *et al.*, 2010) ^[10]. Thus, it is efficacious to teach persons healthy eating patterns when they are young. High risk eating behavior and physiological risk factors are difficult to change once they are established during youth (Rao, Vijaya Pushpam, Subba Rao, Antony, Sarma, 2007) ^[9]. Children in the age range of 7-9 years are in middle childhood. In this stage, they have a good understanding of causality, categorization, reasoning and critical thinking and are able to read. The child at this stage is engaged in social interaction and enjoys Peer Company. Children need nutrition education to help them develop lifelong eating patterns consistent with the dietary Guidelines. Health promotion activities for children at this stage can benefit every child for a lifetime and conversely failure to do so can be costly to the child, family and the nation.

Schools are ideal settings for nutrition education. School based nutrition education is particularly important because today children and adolescents frequently decide what to eat with little adult supervision (Sharma, 2007) ^[11]. The increase in one parent family or families having two working parents and the availability of convenience foods and fast – food restaurants inhibits parents monitoring of their children's eating habits.

All schools offer nutrition education services, to a limited extent within the curriculum. Nutrition education is concentrated within science classes and school physical activity programme. However the intensity and quality of nutrition messages students are receiving is not adequate to help them make wise choices of healthy food from the ocean of processed and junk foods flooded in the market. Topics in nutrition covered in schools are about the relationship between diet and health food, sources of nutrients and balanced diet. Overall focus is on increasing knowledge about what is meant by good nutrition with less emphasis on influencing student attitude towards healthy food choice and eating behaviour. Most schools use materials developed by science text books.

It is not enough to change the food on the plate, but also to provide knowledge and skills that enable children to make choices that lead to a nutritious diet and improve health. The alarming rise in childhood obesity is also a great concern.

Methodology

Two private co-education schools in Chennai Central Zone were chosen. Selection of the schools was purposeful based on the interest, cooperation and willingness shown by the school authorities. The schools matched in their popularity, type of management, similar socio- economic status and infrastructure.

Selection of the Sample

All students in standard 3 and 4 who were in the age range of 7-9 years were invited to participate. Written consent was collected from parents/guardians. No objection was raised by any parents. There were 402 students at the start of the study. However due to student absences at subsequent administration only 305 finished the programme.

Research Design

By employing Solomon's Design with four groups (two experimental group and two control groups) efficacy of Nutrition Education Program was tested. As the design was

basically longitudinal in nature, extraneous factors such as maturity, history and sensitivity to testing were kept away with the help of Solomon's Design. The design could be drawn as below.

Yi X Yii (Experimental Group1)

Yi -X Yii (Control Group 1)

X Yii (Experimental Group 2)

-X Yii (Control Group 2)

Research tools

The following tools were used for the study.

- Constructed and validated Questionnaire for pre and post intervention assessment.
- Anthropometric assessment of Nutritional status
- Interactive Health Curriculum.

Construction and validation of tool

Standardized tools available for intervention did not encompass the range of factors of interest as well as the choice of food items used, did not fully capture the spectrum of foods in the Indian context. Therefore it was decided to develop a questionnaire and establish its reliability and validity. The internal consistency and rational validity was found to be high with 0.76 and 0.93 as their correlation coefficients and rational validity coefficients were 0.83 and 0.87 respectively.

Questions formulated to assess nutritional knowledge and dietary behavior included composition of food, functions of nutrients, healthy choices, portion size, consumption of breakfast, milk, water, vegetables, fruits and snacks.

Educational Intervention

The intervention material was developed based on Social Cognitive Theory. It was called the HEAD PROGRAM- Abbreviation of Healthy Eating and Activity Daily Program. The interactive curriculum was intended to accomplish three important objectives. First was to convey needed information on the facts about nutrition, so students are knowledgeable about healthy eating practices. The second was to change unhealthy attitudes so students have the motivation to establish healthy eating practices. The third was to teach positive skills, so students have all the tools to accomplish their nutritional goals. The following aspects were included

- ❖ Importance of food & nutrients
- ❖ Functions of Nutrients
- ❖ Balanced Diet
- ❖ Eat well Plate
- ❖ Concept of portion size, Energy Balance
- ❖ Snacks and Treats
- ❖ Junk Foods
- ❖ Food Hygiene
- ❖ Physical activity and fitness

Program Implementation

The curriculum consisted of the above mentioned units. Lessons were taught separately for class 3 and 4. Each session was for 40 minutes. Two sessions per week were conducted for a period of three months. To help students to try the recommended behavior and build link with families, the program included campaigns such as - Bring -3-a-day (vegetables and fruits), Nature walk. To impart nutrition education, an assortment of educational methods both structured and unstructured including lectures, games, puzzles, role play and various hands on activities were used.

To apply strict control of research to the project, the curriculum was taught by the investigator only. Children were randomly assigned to experimental and control groups. Random assignment of children to experimental and control conditions ensured more or less equal base, devoid of bias for the investigator to assess the

efficacy of “Nutrition Education Program”. Though Solomon’s four group design was used for the present study, only two of those four groups namely experimental group I and control group I were administered the tool of assessment to know their base level or pre intervention score.

Table 1: Distribution of subjects

Categories	Boys		Girls		Total
	Number	%	Number	%	
Experimental Group I (pre and post)	36	47	40	53	76
Control Group I (pre and post) Experimental Group II (only post)	33	44	42	56	75
Control Group II (only post)	35	45	42	55	77
Total	136		169		305

A total of 305 children completed the study of which 136 were boys and 169 were girls. There were 76 and 77 subjects in Experimental groups I and II respectively and 75 and 76 subjects in Control groups I and II.

Organization, children in the sample were classified into four categories namely (i) Thin (ii) Normal (iii) Over Weight and (iv) Obese. Percentage values of number of boys and girls aged between 7 and 9 years in each of these four categories were calculated and subsequently critical ratio was computed to ascertain significance of gender difference for each category of nutritional status.

Gender and Nutritional Status of 7 to 9 Year Old Children

Body mass index was taken as an indicator of nutritional status. Following the guidelines of World Health

Table 2: Number of Boys and Girls aged 7 to 9 years in four categories as per Body Mass Index and Percentage Critical Ratio

Categories	Boys		Girls		Standard Error	Critical Ratio
	Number	%	Number	%		
Thin	08	5.84	12	7.02	3.93	0.30
Normal	90	65.69	111	64.91	3.96	0.20
Overweight	27	19.71	33	19.30	2.71	0.15
Obese	11	8.76	13	8.77	1.92	0.005
TOTAL	136	100.00	169	100.00	-	-

From the table, it could be inferred that there was no significant gender difference among children of 7 to 9 years. Percentage values with regard to number of boys and girls in each of the four categories namely (i) Thin, (ii) Normal, (iii) Over weight and (iv) Obese remained more or less the same. Differences in the percentage values between boys and girls in each of the above mentioned categories were not found to be statistically significant as indicated by percentage critical ratio. These findings clearly brought out a fact that gender difference with regard to various bio psycho social factors would become rather significant only after the attainment of

puberty. Interaction of hormonal and psychosocial factors during adolescence and adulthood could make gender difference regarding nutritional status quite marked. As the sample for the present study happened to be children of 7 to 9 years, there was no significant gender difference on nutritional status. Marwaha *et al.*, (2011)^[7] and Khadgawat *et al.*, (2013)^[6] also had reported that gender difference on body mass index was not significant especially up to the age of 8 or 9 years. Later on gender difference became quite significant. Hence the education programme was given to both the genders as a single group.

Table 3: Mean, Standard Deviation and Critical Ratio (C.R.) Values of Nutritional knowledge and Dietary behavior of Children in Experimental Group and Control Group I at Pre and Post Intervention Phases.

Psycho Social Aspects of Nutritional Health	Experimental Group 1				C.R.	Control Group 1				Critical Ratio
	Pre		Post			Pre		Post		
	Mean	S.D.	Mean	S.D.		Mean	S.D.	Mean	S.D.	
Nutritional Knowledge	36.45	1.98	43.09	3.71	6.71**	36.04	1.79	39.15	3.82	5.36**
Dietary Behaviour	15.96	3.09	19.00	3.27	4.90**	15.93	3.40	14.35	2.17	2.93**

Table 3 indicates that consistently there was a significant improvement between pre and post intervention phases on nutritional knowledge and dietary behavior of children in experimental group I. Children in the experimental and control group scored similarly in the questions on functions of food. However nutritional knowledge pertaining to composition of food, healthy choices and portion size was higher in the experimental group that underwent the intervention program. Children in the experimental group

also showed significant improvement on the intake of a healthy breakfast, consumption of vegetables and water. There was no difference seen in the intake of fruits and this may attributed to unavailability at home. Surprisingly children in control group I showed significant gain with regard to nutritional knowledge during post intervention phase in comparison to pre intervention phase. Though they were not made to attend the “Nutrition Education Program” which was the intervention given to

experimental groups in the present study, significant gain in the scores of control group1 at the post intervention phase of assessment should definitely be attributed to the effect of pre intervention assessment. To substantiate this fact and to nullify the effect of pretesting Solomon's four group design was put into action in the present investigation.

In any repeated measures design involving pre and post intervention assessments, adequate care should be taken to nullify the extraneous effects such as maturation, pretesting, history of occurrence of any significant event during the study period etc., on dependent variable measures. So inter group comparisons were made on post intervention scores pertaining to nutritional knowledge and dietary behavior.

Table 4: Mean, Standard Deviation and Critical Ratio (C.R.) Values of Nutritional Knowledge of Children in Experimental Groups 1 and 2, Control Groups 1 and 2 at Post Intervention Phase.

Groups	Mean	Std. Devn	Comparison	Std Error	t value
Experimental Group1 (EG1)	43.09	3.71	E.G.1 with C.G.1	0.57	12.37**
			E.G.2 with C.G.2	0.54	2.70**
Control Group1 (CG1)	36.04	1.79	E.G.1 with E.G.2	0.67	5.88**
			C.G.1 with C.G.2	0.40	4.13**
Experimental Group2 (EG2)	39.15	3.82	E.G.1 with C.G.2	0.60	9.00**
			E.G.2 with C.G.1	0.50	6.22**
Control Group2 (CG2)	37.69	2.75			

** P <.01

From table 4 it could be seen that children aged between 7 and 9 years in experimental groups 1 and 2 had significantly better nutrition knowledge than those who were in control groups 1 and 2. Intergroup comparisons revealed the significant impact of "Nutrition Education Program" on nutrition knowledge of children in experimental groups. Children in experimental group1 were found to have more knowledge with regard to nutrition than those who were in experimental group2; this might indicate the influence of pre intervention assessment in addition to the intervention. But children in control group2 were found to be better than those in control group1 on nutrition knowledge. This definitely would minimize the speculation of effect of pre intervention

testing on the dependent variable measure. Children in experimental group2 were also found to have better nutrition knowledge than children in control group1. This would further strengthen the argument in favour of the intervention devoid of pre intervention assessment. Multiple group comparison in pairs filtered the effects of other extraneous factors such as maturation, history of occurrence of any other significant event etc on the dependent variable measure namely nutrition knowledge; because all the comparisons of groups in pairs brought out significant differences in favour of the intervention which undoubtedly increased nutrition knowledge in the children aged between 7 and 9 years.

Table 5: Mean, Standard Deviation and Critical Ratio (C.R.) Values on Dietary Behaviour of Children in Experimental Groups 1 and 2, Control Group 1 and 2 at Post Intervention Phase.

Groups	Mean	Std. Devn	Comparison	Std Error	t
Experimental Group1 (EG1)	19.00	3.27	E.G.1 with C.G.1	0.54	8.61**
			E.G.2 with C.G.2	0.50	1.08
Control Group1 (CG1)	14.35	2.17	E.G.1 with E.G.2	0.59	3.51**
			C.G.1 with C.G.2	0.44	4.64**
Experimental Group2 (EG2)	16.93	3.40	E.G.1 with C.G.2	0.55	4.75**
			E.G.2 with C.G.1	0.49	5.27**
Control Group2 (CG2)	16.39	2.71			

** P <.01

As per table 5, all the intergroup comparisons except between experimental group 2 and control group 2 brought out significant difference on dietary behaviour among children in the age group of 7 and 9 years. Though the impact of "Nutrition Education Program" could be seen on dietary behaviour of these children, absence of significant difference between children in experimental group2 and those in control group2 might indicate the subtle influence of pretesting on the dependent variable measure. On seeing the children in experimental group1 with higher mean score on dietary behaviour than their counterparts in experimental group2, doubt regarding the influence of pretesting on the dependent variable score besides "Nutrition Education Program" would become all the more strong. But as there was significant difference between control group 2 and control group1 (children in control group2 showed better dietary behaviour than those in control group1) on dietary behaviour, the speculation regarding the effect of pretesting on dietary behaviour could be laid to rest.

Conclusion

The study highlights the importance of nutrition education to improve the nutritional knowledge and dietary behavior of children aged 7-9 years. With the increase in purchasing power of urban school children, it is very important that they have the specific knowledge to make healthy food choices. Catching children young to nutrition education is important as wrong habits once established are very difficult to change. The findings demonstrate that the nutrition intervention programme positively impacted children's nutritional knowledge and dietary behavior. After the intervention, children who participated in the programme expressed greater confidence to select healthy foods while eating out. Though schools have a minimum influence on the food environment, it plays a pivotal role in providing health education and understanding about healthy lifestyle.

Limitations of the study

One of the limitations to the current study was the inability to involve parents in the education programme, which may result in long term behaviour change. Another limitation is that it focused only on the high income group.

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