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Research Article

Effectiveness of Computer-assisted Teaching Program on Malnutrition and its Prevention in Under-five Children among Adolescents Studying in Selected Pre-university College, Bengaluru

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ABSTRACT

Introduction: In developing countries, malnutrition among children is a major public health issue. It is one of the most serious global risk factors for illness and death. Malnutrition during children has an impact later in life as it is associated with significant functional impairment, reduced work capacity, and decreased economic productivity. Malnourished children are more likely to suffer from delayed psychological development, poor school performance, and lower intellectual achievements. **Aim:** The study was aimed to evaluate the effectiveness of computer-assisted teaching program (CATP) on malnutrition and its prevention in under-five children among adolescents studying in selected Pre-university College (PUC), Bengaluru. **Methods:** A total of 50 students for the academic year 2014–2015 at selected PUC, Bengaluru, were enrolled through simple randomization method in this quasi-experimental study. A structured knowledge questionnaire was developed and had a total of 36 questions related to knowledge and its prevention of malnutrition. **Results:** After administration of teaching program, 92% of subjects had adequate knowledge and 8% had moderate knowledge. None of the subjects had inadequate level of knowledge showing effectiveness of teaching program. Post-test overall knowledge score was significantly higher in comparison to pre-test overall knowledge score (32.20 ± 8.77 vs. 8.14 ± 10.99; $P = 0.01$). Age, gender, nationality, family income, fathers' occupation, mothers' education, religion, students' status, previous knowledge, and source of information were significantly associated with the post-test level of knowledge on malnutrition and its prevention. **Conclusion:** CATP is effective in increasing knowledge of adolescent regarding malnutrition and its prevention in under-five children.

Keywords: Malnutrition, Public health, Teaching program

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Introduction

Malnutrition in pre-school children is a significant problem and has been identified by the World Health Organization as the most lethal form of disease which indirectly causes an annual death of at least 5 million children worldwide.[1] Malnutrition is widely recognized as a major health problem in developing countries. It is widespread in rural, tribal, and urban slum areas. Growing children are most vulnerable to its consequences. Anthropometry is a simple field technique for evaluating physical growth and nutritional status of the children.[2]

The United Nations Food and Agriculture Organization estimates that nearly 870 million people of the 7.1 billion people in the world, or one in eight, were suffering from chronic undernourishment in 2010 to 2012. Almost all the hungry people, 852 million live in developing countries, representing 15% of the population of developing counties.

At present, two-third of the deaths of the children around the world are directly or indirectly associated with nutritional deficiencies. Nearly half of India's children – approximately 60 million – are underweight, 45% have stunted growth (too short for their age), 20% are wasted (too thin for their height, indicating acute malnutrition), 75% are anemic, and 57% are deficient in Vitamin A.[3]

The findings of the third National Family Health Survey-3 revealed an unacceptable prevalence of malnutrition in our children: 42.5% of our children under the age of 5 years are underweight (low weight for age), 48% of our children are stunted (low height for age – chronically malnourished), 19.8% of our children are wasted (low weight for height – acutely malnourished), and in poorer states, the situation is even worse with over 50% of children underweight.[4]

Malnutrition is both a cause and consequence of disease and illness and there can be many contributing factors. While some causes of malnutrition might be the result of underlying ill health, disease, or the body's inability to absorb nutrients, malnutrition can also be linked to other experiences or factors in a person's life.[5]

The costs of malnutrition run into billions of pounds in spite of proven interventions that can prevent identify and manage the problem and risks promptly and thereby reduce the human suffering and the astronomical associated costs.[5]

Studies have revealed that severe degree of malnutrition can be reduced by practice of exclusive breastfeeding, introduction of timely complementary feeding, education for maintaining personal hygiene, proper implementation of Universal Immunization Program immunization, periodic deworming, standard case management of diarrhea, and acute respiratory infection as well as continuation of feeding during illness among under-five children.

With reference to the above studies, malnutrition is quite prevalent in our state and the major cause is lack of knowledge among caretakers which needs to be addressed. Hence, the study was aimed to evaluate the effectiveness of computer-assisted teaching program (CATP) on malnutrition and its prevention in under-five children among adolescents studying in selected Pre-university College (PUC), Bengaluru.

Methodology

Fifty students for the academic year 2014–2015 at selected PUC, Bengaluru, were enrolled through simple randomization method in this quasi-experimental study. The students were included in the study if present during the study, for the academic year 2014–2015, were the part of the selected college, and ready for consent to participate in the study. The students were excluded if on leave, vacation, on sick leave, absent for study or on vacation, and did not provide consent for participation.

Data collection tool

A structured knowledge questionnaire was developed through extensive study of literature and discussion with experts. Content validity of the tool was confirmed through nine experts. The tool consisted of two sections and had a total of 36 questions.

- Section I contained questions related to demographic variables of the study population. Demographic variables include age, sex, religion, income of family (father), educational status of parents (father and mother), occupation of parents (father and mother), student's status, previous knowledge and its source, and source of information
- Section II contained items related to knowledge regarding malnutrition and its prevention.

Scoring procedure

For knowledge items, each correct answer was given a score of "one" and incorrect answer a score of "zero." The knowledge questionnaire has 36 items regarding malnutrition and its prevention for the correct answer given score of "one." Hence, the total score was 36 for the knowledge questionnaire.

Methods

Permission from concerned authority

Formal written permission was obtained from selected educational institutes, Bangalore, before the data collection from respondents to assess the effectiveness of CATP on malnutrition and its prevention.

After the formal written permission was obtained from the concerned authority and the study was conducted during the month of January from January 28, 2015, to February 5, 2015, at Acharya PUC, Bangalore. Respondents were selected in accordance with laid down criteria. Consent was obtained from each respondent after giving assurance of confidentiality.

Statistical analysis

Data were presented as frequency, percentage, mean, and standard deviation. Categorical variables were compared using Chi-square test. Paired *t*-test was used to compare pre-test and post-test knowledge score. $P < 0.05$ was considered statistically significant. Statistical analysis was performed using the SPSS v21.

Table 1: Demographic characteristics

Characteristics	Category	Subjects Frequency (%)
Age (in years)	16	26 (52)
	17	24 (48)
Gender	Male	17 (34)
	Female	27 (90)
Nationality	Indian	49 (98)
	Foreigner	1 (2)
Family income (KSES) father (in rupees)	>32,050	12 (24)
	16,020–32,049	12 (24)
	12,020–16,019	12 (24)
	8010–12,019	9 (18)
	4810–8009	2 (4)
	1601–4809	2 (4)
	<1600	1 (2)
Occupation of family (KSES) father	Profession	20 (40)
	Semi-profession	5 (10)
	Clerical, shop owner	15 (30)
	Skilled worker	5 (10)
	Semi-skilled worker	0 (0)
	Unskilled worker	2 (4)
	Unemployed	3 (6)
Occupation of family (KSES) mother	Profession	6 (12)
	Semi-profession	4 (8)
	Clerical, shop owner	10 (20)
	Skilled worker	11 (22)
	Semi-skilled worker	0 (0)
	Unskilled worker	0 (0)
	Unemployed	19 (38)
Education status (KSES) father	Profession	7 (14)
	Graduate or postgraduate	12 (24)
	Intermediate or post-high school	9 (18)
	High school certificate	18 (26)
	Middle school certificate	2 (4)
	Primary school certificate	1 (2)
	Illiterate	1 (2)
Education status (KSES) mother	Profession	2 (4)
	Graduate or postgraduate	16 (32)
	Intermediate or post-high school	7 (14)
	High school certificate	17 (34)
	Middle school certificate	2 (4)
	Primary school certificate	2 (4)
	Illiterate	4 (8)
Religion	Hinduism	50 (100)
	Islam	0 (0)
	Christianity	0 (0)
	Others	0 (100)
Students place of residence	Day scholar	45 (90)
	Paying guest	2 (4)
	Hosteller	3 (6)
Previous knowledge	Yes	13 (26)
	No	37 (74)
Source of information	Magazines/books/posters	16 (32)
	TV/radio/internet	32 (64)
	Friends/neighbor/health personnel	2 (4)

Results

General characteristics

Table 1 shows general characteristics according to age, sex, family income of parents, occupation of parents, educational status of parents, religion, student's place of residence, and previous knowledge on malnutrition and source of information of the subjects. Among 50 subjects, majority 52.0% of subjects belong to 16 years and 48.0% belongs to 17 years. Majority 66% of subjects were male subjects and 34% were female subjects. About 98% of subjects were Indian.

About 24.0% of subject's father had income Rs. ≥32,050, 24.0% had Rs. 16,020–32,049, 24.0% had Rs. 12,020–16,019, 18.0% had 8010–12,019, 4% had Rs. 4810–8009 income, 4% had 1601–4809, and 2% had Rs.<1600 income, respectively. About 40% of fathers were professional, 30.0% were as clerical, shop owner farmer, 10% were semi-professions, 10% were skilled worker and 6% were unemployed and 4% were unskilled worker, and none were semi-skilled worker, respectively. About 38% of mothers were unemployed, 22% were skilled worker, 20% clerical, shop owner farmer, 12% were professional, 8% semi-professional, and none were semi-skilled worker and unskilled worker, respectively.

About 26.0% of father had completed high school certificate, 24.0% had completed graduate or postgraduate, 18.0% had completed intermediate or post-high school diploma,

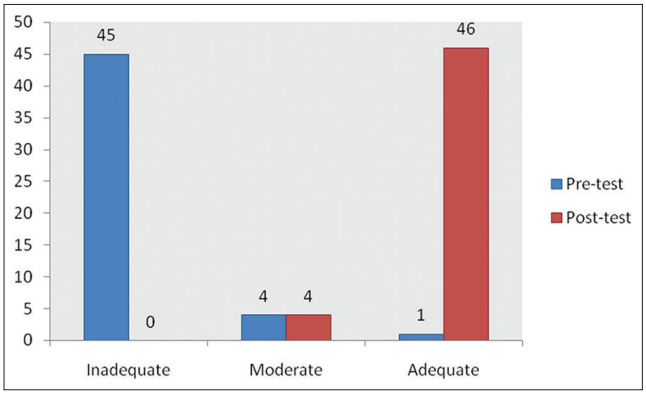

Figure 1: Distribution of subjects on the basis of the level of knowledge in pre-test and post-test; X-axis shows number of subjects. Y-axis shows the level of knowledge in pre- and post-test

Table 2: Comparison of individual aspects of knowledge

Aspect	Pre-test Mean±SD	Post-test Mean±SD	*P* value
Introduction, definition, and incidence	1.20±1.78	5.20±1.32	<0.05
Classification and causes	2.53±3.65	8.98±2.72	<0.01
Diagnosis and signs and symptoms	1.43±1.92	5.10±1.75	<0.001
Management and prevention	2.98 ± 3.64	12.92 ± 2.98	<0.01

14.0% were profession, 4.0% had completed middle school certificate, 2.0% had completed primary school certificate, and 2.0% were illiterate respectively. About 34% of mothers had completed high school certificate, 32% had completed graduate or postgraduate, 14% had completed intermediate or post-high school diploma, 8% were illiterate, and 4.0%

Table 3: Association of post-test knowledge level of subjects with demographic variable *n*=50

Aspect wise comparison		Knowledge score *n* (%)			Pearson Chi-square test
		Inadequate	Moderate	Adequate	
Age (in years)	16 years old	0 (0)	2 (50)	24 (51.17)	χ^2=2.52 *P*=0.01
	17 years old	0 (0)	2 (50)	22 (47.82)	Df2, significant
Gender	Male	0 (0)	3 (75)	30 (65.21)	χ^2=3.29 *P*=0.02
	Female	0 (0)	1 (25)	16 (34)	Df2, significant
Nationality	Indian	0 (0)	4 (100)	45 (97.82)	χ^2=1.03 *P*=0.0220
	Foreigner	0 (0)	0 (0)	1 (2.17)	Df2, significant
Family income	Rs. 32,050	0 (0)	1 (20)	11 (23.9)	χ^2=6.43 *P*=0.0290
	Rs. 16,020–32,039	0 (0)	1 (20)	11 (23.9)	Df 6, significant
	Rs. 12,020–16,019	0 (0)	2 (50)	10 (21.7)	
	Rs. 8010–12,019	0 (0)	0 (0)	9 (19.5)	
	Rs. 4810–8009	0 (0)	0 (0)	2 (4.3)	
	Rs. 1601–4809	0 (0)	0 (0)	2 (4.3)	
	Rs. <1600	0 (0)	0 (0)	1 (2.1)	
Occupation of father	Profession	0 (0)	2 (50)	18 (39.13)	χ^2=3.32 *P*=0.0390
	Semi-profession	0 (0)	0 (0)	5 (10.8)	Df6, significant
	Clerical	0 (0)	1 (25)	14 (30.43)	
	Skilled worker	0 (0)	1 (25)	4 (8.69)	
	Semi-skilled	0 (0)	0 (0)	0 (0)	
	Unskilled	0 (0)	0 (0)	2 (4.3)	
	Unemployed	0 (0)	0 (0)	3 (6.5)	
Occupation of mother	Profession	0 (0)	0 (0)	6 (13.04)	χ^2=6.47 *P*=0.65
	Semi-profession	0 (0)	1 (25)	3 (6.5)	df6, non-significant
	Clerical	0 (0)	1 (25)	9 (19.56)	
	Skilled worker	0 (0)	1 (25)	10 (21.73)	
	Semi-skilled	0 (0)	0 (0)	0 (0)	
	Unskilled	0 (0)	0 (0)	0 (0)	
	Unemployed	0 (0)	1 (25)	18 (39.13)	
Education (Father)	Profession	0 (0)	1 (25)	6 (13.04)	χ^2=5.42 *P*=0.719
	Graduate	0 (0)	1 (25)	11 (23.91)	df6, non-significant
	Intermediate	0 (0)	0 (0)	9 (19.56)	
	High school	0 (0)	2 (50)	17 (36.95)	
	Middle school	0 (0)	0 (0)	2 (4.3)	
	Primary school	0 (0)	0 (0)	1 (2.1)	
	Illiterate	0 (0)	0 (0)	1 (2.1)	
Education (Mother)	Profession	0 (0)	0 (0)	2 (4.3)	χ^2=3.23 *P*=0.0390
	Graduate	0 (0)	2 (50)	5 (10.8)	Df6, significant
	Intermediate	0 (0)	1 (25)	6 (13.04)	
	High school	0 (0)	1 (25)	16 (34.78)	
	Middle school	0 (0)	0 (0)	2 (4.3)	
	Primary school	0 (0)	0 (0)	2 (4.3)	
	Illiterate	0 (0)	0 (0)	4 (8.69)	
Religion	Hinduism	0 (0)	4 (100)	46 (100)	χ^2=1.58 *P*=0.01
					Df1, significant
Students status	Day scholar	0 (0)	3 (75)	42 (91.3)	χ^2=2.28 *P*=0.046
	Paying guest	0 (0)	1 (25)	1 (2.1)	df2, significant
	Hosteller	0 (0)	0 (0)	3 (6.5)	
Previous knowledge	Yes	0 (0)	2 (50)	11 (23.91)	χ^2=1.59 *P*=0.0492
	No	0 (0)	2 (50)	35 (76.08)	df2, significant
Source of information	Magazine	0 (0)	3 (75)	13 (28.26)	χ^2=3.310 *P*=0.0220
	TV	0 (0)	1 (25)	31 (67.39)	df2, significant
	Friends	0 (0)	0 (0)	2 (4.3)	

had completed profession, middle school certificate, and primary school certificates, respectively.

All of the subjects were Hindu. About 90% were day scholar, 6.0% were hosteller, and 4% were paying guest. About 74% of the subjects were not exposed to knowledge on malnutrition and its prevention and 26% of the subjects were exposed to knowledge on malnutrition and its prevention. About 64% of subjects had information from TV/Radio/Internet, 32% had information from magazines/books/posters, and 4% of subjects had information from friends/neighbors/health personnel.

Comparison of knowledge level

We classified knowledge level on the basis of total score. Subjects who scored ≥65% were considered to have adequate knowledge. Scores with 41–65% were considered moderate knowledge and scoring <40% was considered inadequate knowledge.

We observed that 90% of the subjects had inadequate knowledge in pre-test. While only 8% and 2% subjects had moderate and adequate level of knowledge respectively. After administration of teaching program, 92% of subjects had adequate knowledge and 8% had moderate knowledge. None of the subjects had inadequate level of knowledge showing effectiveness of teaching program [Figure 1].

Comparison of knowledge score

We also evaluated effectiveness of total knowledge score following administration of teaching program. We observed that post-test overall knowledge score was significantly higher in comparison to pre-test overall knowledge score (32.20 ± 8.77 vs. 8.14 ± 10.99; $P = 0.01$).

We also evaluated knowledge of individual aspects on knowledge scores related to malnutrition and its prevention. We observed that all the aspects of the knowledge were significantly higher following administration of the teaching program [Table 2].

Association of demographic variables with knowledge level

We also evaluated relation of the demographic variables with post-test knowledge level. We observed that age, gender, nationality, family income, fathers' occupation, mothers' education, religion, students' status, previous knowledge, and source of information were significantly associated with the post-test level of knowledge on malnutrition and its prevention ($P < 0.05$) [Table 3].

Discussion

The links between nutrition and health are well known, with good nutrition accepted as one of the primary determinants of optimal growth, good health, and well-being.[6] Accordingly, an unhealthy diet has been identified as a major risk factor for the global increase in chronic non-communicable diseases such as coronary artery disease, cardiovascular disease, cancer, diabetes, and obesity.[7,8] A large proportion of these diseases can be avoided as they are either initiated or accelerated by unhealthy nutrition in addition to other etiologies. In recent years, there has been a growing worldwide concern about the dietary and nutritional needs of children.[9]

Our study observed that CATP was significantly effective in increasing knowledge on malnutrition and its prevention. Similar findings have also been reported in the previous studies. Betagiri and Tata[10] compared the effectiveness of structures teaching program on knowledge regarding Integrated Child Development Services (ICDS) program among mothers of under-five children. They concluded that structured teaching program regarding ICDS program was an effective method for providing adequate knowledge and helped mothers to enhance their knowledge and utilization of services provided under ICDS program. Similarly, Isarannavar *et al.*[11] showed that effectiveness of structured teaching program helps to gain the knowledge score on malnutrition and the preparation of Hydrabadi and Davanagere mix recipe.

It is essential for community health nurse to develop knowledge regarding malnutrition, its management and prevention to avoid life-threatening complications among under-five children.

Conclusion

CATP is effective in increasing knowledge of adolescent regarding malnutrition and its prevention in under-five children.

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